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APPLICATION OF AN INTERDISCIPLINARY  
ROTARY-WING AIRCRAFT ANALYSIS TO  
THE PREDICTION OF HELICOPTER  
MANEUVER LOADS

William D. Anderson, et al

Lockheed-California Company

Prepared for:

Army Air Mobility Research and Development  
Laboratory

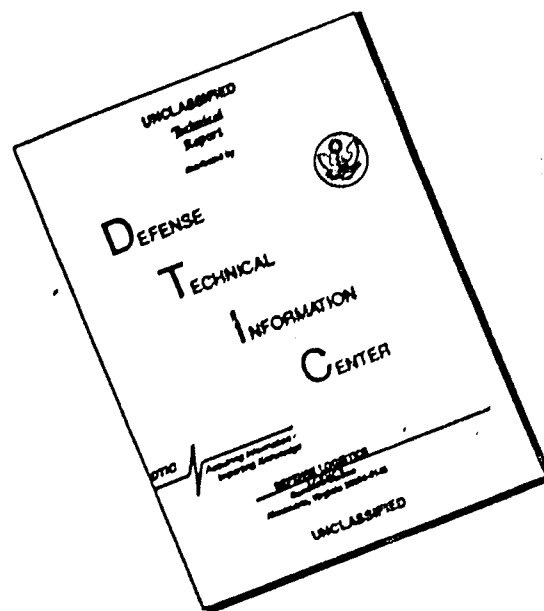
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| 13. ABSTRACT<br><br>An interdisciplinary analytical model for total vehicle simulation, revised and extended rotor (REXOR), has been developed to provide a tool for predicting the flight envelope of rotary-wing aircraft in terms of performance, dynamic stability, handling qualities, and transient load limits. A study was undertaken to correlate this analysis with steady-state and transient flight test maneuver loads data for the AH-56A and XH-51A compound helicopters.<br><br>The flight test data for the correlation study covers compound helicopter operation at speeds between 111 and 204.5 KIAS, gross weights from 4500 to 18,300 pounds, and normal load factors between 0.2 and 2.0 g. Fifty-six flight test cases were selected, from which thirty-seven steady-state cases and twelve transient cases have been correlated. Harmonic components of steady-state flap and chord loads test data at various rotor blade spans are compared with analytical estimates for the steady-state cases, while time history comparisons of the transient maneuver loads are presented. Feather moment and some blade torsion loads are also compared.<br><br>The results of the correlation study indicate that the analysis provides sufficient correlation of low harmonic blade loads to be a useful prediction tool for transient maneuver loads and to define vehicle flight envelopes. Areas where the method needs improvement are discussed.<br><br>The report contains a discussion of the model and its applications, a description of the two test aircraft and their instrumentation, and a summary of correlation results. A detailed listing of harmonic components of steady-state flight test data, a detailed comparison of the harmonic components of test and analysis, a listing of REXOR input data for both test aircraft, and a comparison of REXOR with the C-81 program are presented in appendices. |  |  |                       |

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| Compound Helicopters                |        |    |        |    |        |    |
| Helicopter Rotors                   |        |    |        |    |        |    |
| Helicopter Rotor Loads              |        |    |        |    |        |    |
| Helicopter Transient Maneuver Loads |        |    |        |    |        |    |
| Compound Helicopter Test Data       |        |    |        |    |        |    |
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This report has been reviewed by the Eustis Directorate, U. S. Army Air Mobility Research and Development Laboratory and is considered to be technically sound. The purpose of this program was to investigate the validity of analytically predicting helicopter maneuver flight loads using the REXOR II computer program.

The technical monitor for this contract was Mr. Donald J. Merkley, Aeromechanics, Technology Applications Division.

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December 1973

APPLICATION OF AN INTERDISCIPLINARY ROTARY-WING  
AIRCRAFT ANALYSIS TO THE PREDICTION OF HELICOPTER  
MANEUVER LOADS

Final Report

Lockheed Report 25945

By

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Prepared by

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Burbank, California

for

EUSTIS DIRECTORATE  
U.S. ARMY AIR MOBILITY RESEARCH AND DEVELOPMENT LABORATORY  
FORT EUSTIS, VIRGINIA

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## FOREWORD

This report describes a correlation study comparing REXOR analysis results with flight test data for evaluation of the transient load prediction capabilities of the REXOR analysis. This study was conducted by the Lockheed-California Company from June 1972 to June 1973 under Contract DAAJ02-72-C-0100 (Project 1F162208AA82) with the Eustis Directorate, U.S. Army Air Mobility Research and Development Laboratory. USAAMRDL direction was provided by D. J. Merkley.

Major Lockheed contributors to this report include R. E. Donham, P. Kretsinger, T. Liu, and A. J. Potthast.

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## INTRODUCTION

A complete understanding of the factors which establish the flight envelope of a helicopter requires simultaneous consideration of power, static and dynamic stability, handling qualities, and pilot techniques as well as resulting loads and vibration levels. To facilitate this understanding, an interdisciplinary mathematical model that provides analytical prediction of free-flight characteristics of single-rotor helicopter and compound helicopter configurations has been developed by the Lockheed California Company. This interdisciplinary analysis tool (see Reference 1), known as REXOR (Revised and EXtended rotor), is a fully coupled rotor/body/control system model that includes nonlinear mathematical simulation and has over 30 degrees of freedom.

To make a total vehicle model in sufficient depth to predict detailed transient rotor loads is inhibitive expensive with the current computer state of the art. The approach taken in the formulation of the interdisciplinary model is to produce reasonably accurate transient shaft and fundamental blade loadings which can be used to define a structural flight envelope that may be checked at a few critical points with a detailed rotor loads analysis and be adjusted if required. The model is not designed to provide highly accurate spanwise load distributions or higher harmonic internal blade loads. This study is designed to evaluate REXOR as a tool for prediction of rotor loads in transient maneuvers by providing correlation of both steady and transient computed maneuver loads with compound helicopter flight test data.

The work described in this report presents a loads correlation of the current (REXOR II) program with existing AH-56A and XH-51A (compound) test data with primary focus on steady and cyclic loads during steady and transient maneuvers. The 18,300-pound and 4500-pound gross weights of these aircraft and the relatively large compound helicopter flight envelope of each that has been flown offer a broad spectrum of test conditions between 100- and 200-knot flight speeds. The correlation was done under Contract DAAJ02-72-C-0100, sponsored by the Eustis Directorate, U.S. Army Air Mobility Research and Development Laboratory, Fort Eustis, Virginia.

## BACKGROUND OF REXOR DEVELOPMENT AND APPLICATIONS

Analytical prediction of practical flight envelopes for helicopters including compound configurations requires evaluation of the effects of limits of steady or maneuvering flight on performance, dynamics, handling qualities, and loads. To meet these requirements, analytical models must fully describe the dynamically coupled rotor/body/control system combination, including both nonlinear and the time-variant effects. Outputs of such programs are in the form of transient response time histories, steady-state time histories, steady-state harmonic analyses, and constant or periodic numerical coefficients for use in linear analyses.

REXOR is an integrated rotor/body model of this type which has been applied in the prediction of performance, dynamics, handling qualities, and steady and transient loads for hingeless rotor aircraft throughout their flight envelopes. The analysis method can readily be applied to other rotor systems by minor modifications to the model. Figures 1, 2, and 3 show the organization of the program, body and rotor degrees of freedom, and rotor blade and hub geometric definitions. The approach employed to develop this model was a coordinated effort among specialists in several applicable rotary-wing disciplines. Equations of motion were derived from a basic Lagrangian formulation, resulting in a rotor/body/control system model consisting of 30 fully-coupled degrees of freedom with a minimum of simplifying assumptions. In the formulation, each blade mode, although developed from a multi-degree of freedom analysis, constitutes but a single degree of freedom. In Reference 1, the modeling approach used is discussed in detail along with a description of the procedural ground rules required for successful implementation and use of this type model. This reference includes derivation of the model, program structuring, data management, checkout procedures, and documentation. The basic requirements were that the model fully describe the dynamically coupled rotor/body/control system, including both nonlinear and time-variant effects.

By examining results of this free-flight vehicle analysis, the engineer is able to conduct flight test programs by digital computer. As implemented, the control system, aeroelastic rotor, and body combination requires that the aircraft remain continuously in equilibrium. This permits evaluation of transient control input and subsequent transient response behavior in order to investigate the helicopter's static and dynamic stability. The steady-state loads analysis that can be performed is a restricted case for examining linear systems. In the case of nonlinear or transient behavior, the system is examined in time-varying modes of equilibrium.

Two different gyro-controlled hingeless rotor system concepts have been modeled in REXOR. The first of these, the flap/feather-moment feedback system, was used in the XH-51A and in the early AH-56A configurations.

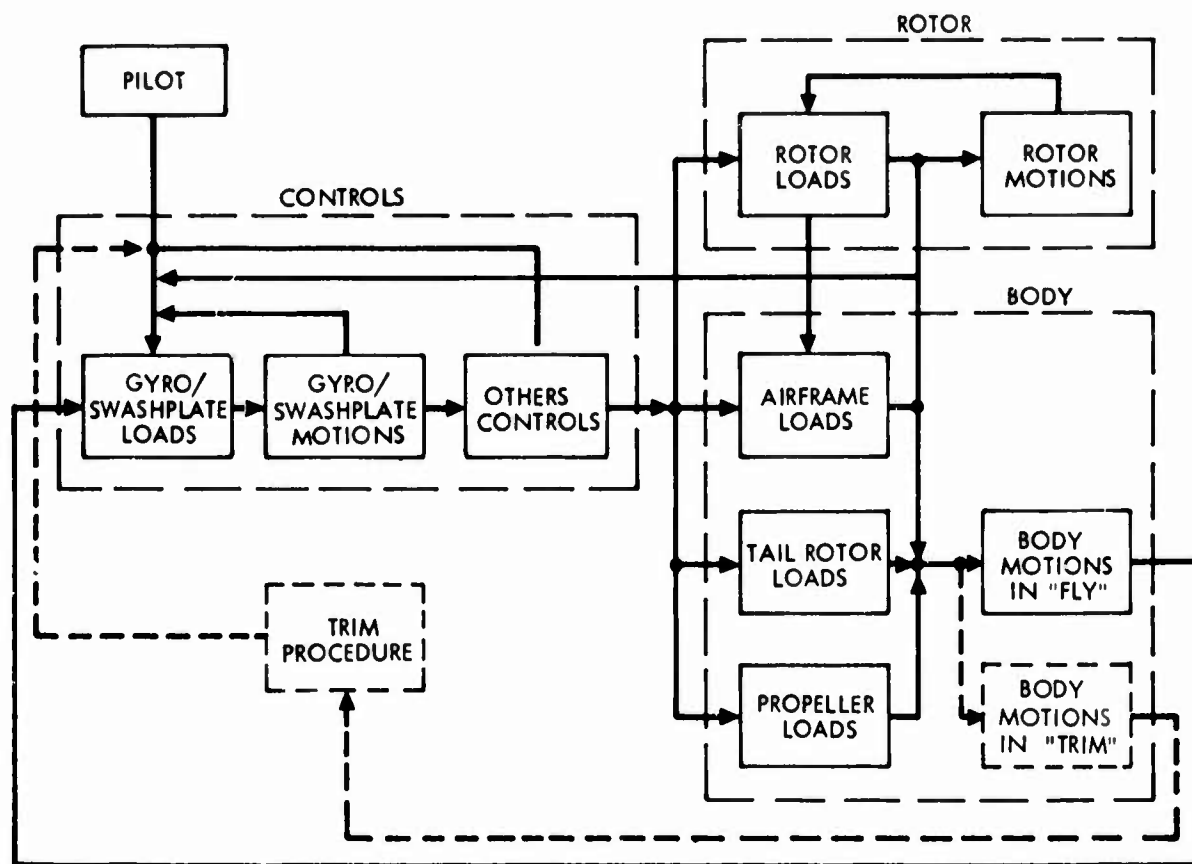


Figure 1. REXOR Program Organization.

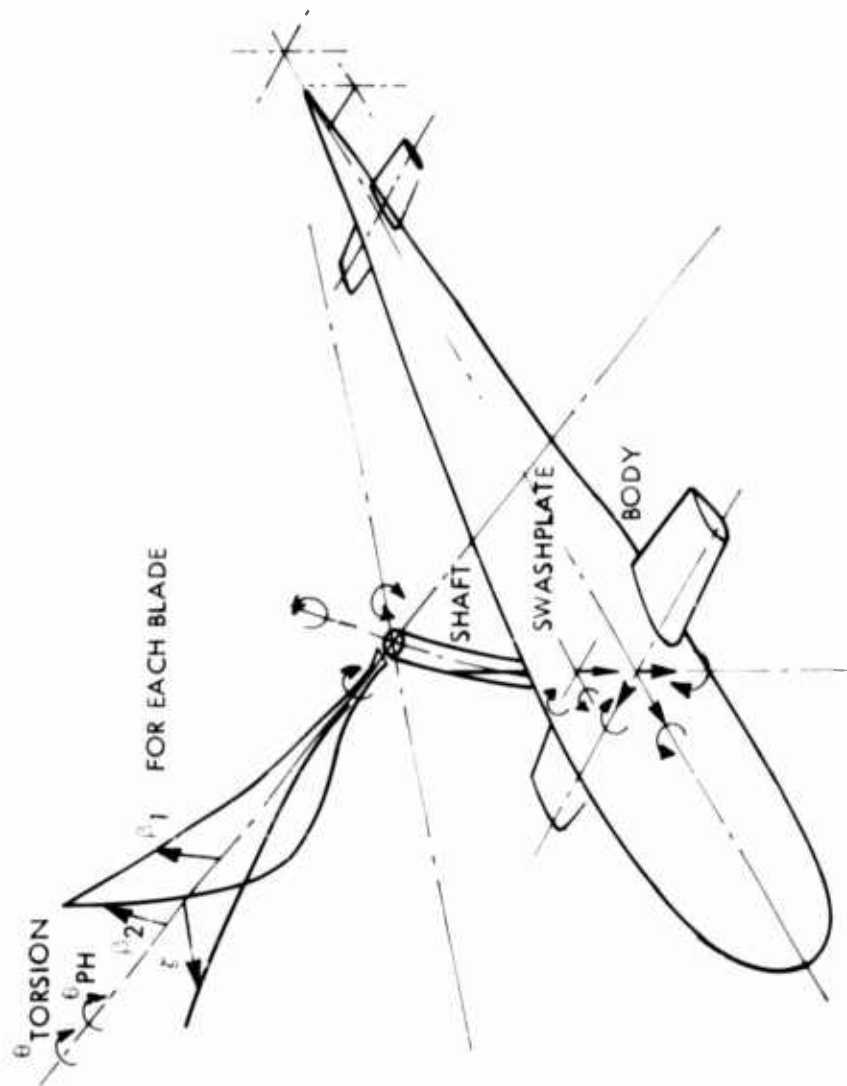


Figure 2. Rotor and Body Degrees of Freedom.

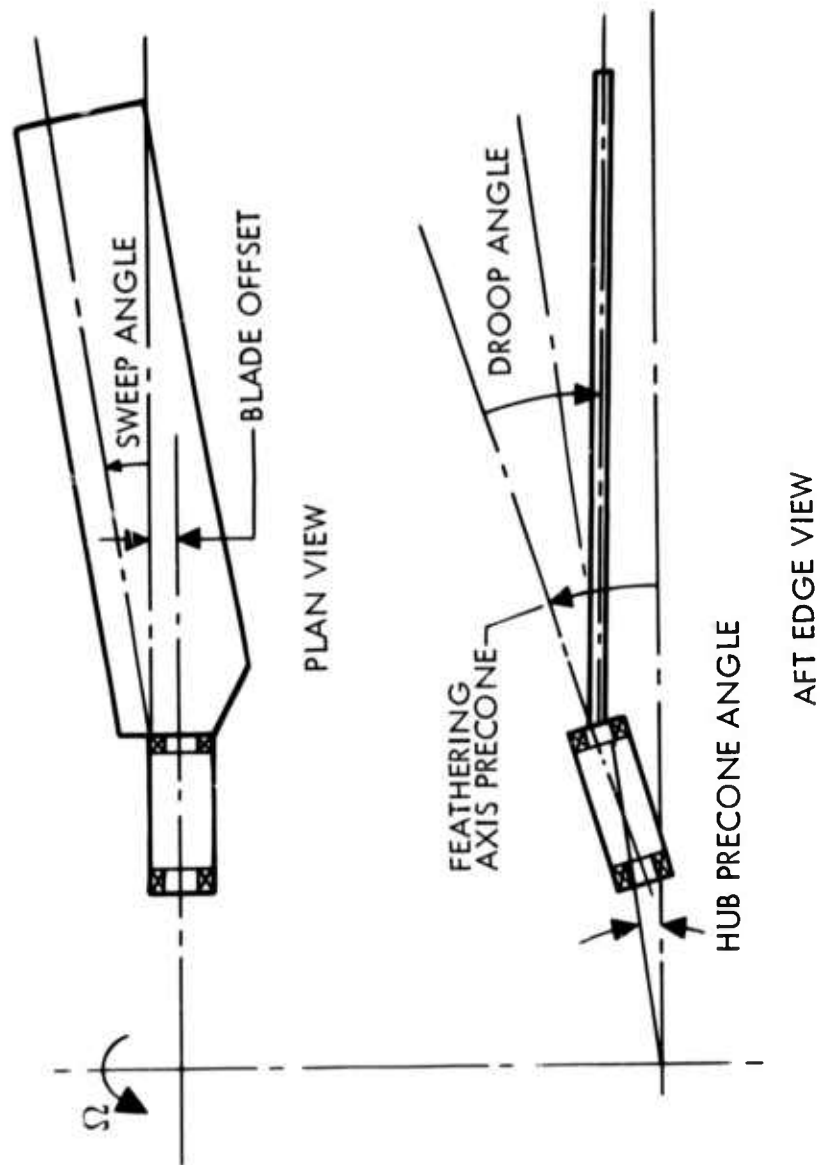


Figure 3. Rotor Blade and Hub Geometry.



This is the system for which correlation will be provided in this report. For the AH-56A, this system is called the Improved Control System (ICS) configuration. The second concept, the Advanced Mechanical Control System (AMCS), is a direct flap-moment feedback system. The REXOR analysis was used extensively in the design of the AMCS, using experience gained in the analysis of phenomena encountered in ICS flight tests. A brief description of each system is presented for reference.

The flap/feather-moment feedback gyro-controlled rotor (ICS) is presented schematically in Figure 4. Figure 5 is a representative simple block diagram of the system. Pilot control input drives an irreversible actuator which applies control moment to the gyro through a positive-negative spring assembly, linkage, and swashplate. With the gyro fixed, compression of the positive spring by the actuator applies control moment to the gyro. With the actuator input fixed, gyro motion drives both the positive and negative spring, the sum of which represents the steady-state impedance to the gyro and the value of the gyro net positive spring. A small damper is used to damp the gyro nutation mode (2P). The gyro responds to the pilot input and drives the rotor blade cyclically through pitch links and a blade control horn.

Cyclic blade angle changes create a rotor flap moment which is transmitted to the aircraft body via the fixed hub and shaft to pitch or roll the aircraft. Precise rotor moment control and reduced rotor lag is obtained by feedback of rotor flap-moment (proportional to rotor shaft moment) through the feather axis to the gyro. Feathering moment proportional to flap moment is obtained by sweeping the blade quarter-chord forward of the feathering axis (sweep angle  $\psi_0$ ), as noted in Figure 4. Feather moment is then proportional to the product of flap moment and effective sweep angle. The total moment applied to the gyro with this concept is the difference of the pilot input and feathering feedback moment proportional to blade flap moment, as shown in Figure 5.

The direct flap-moment feedback rotor system is shown in block diagram form in Figure 6 and in schematic form in Figure 7. The concept is the same as the flap-feathering feedback system except that irreversible hydraulic actuators have been added between the gyro and the cyclic blades. Secondly, only moment proportional to rotor blade cyclic flap moment is fed back to the gyro. Except for the distinct features noted above, the direct flap feedback system operates in the same manner as the feathering feedback system.

Major areas of application of the REXOR analysis are described briefly below.

#### PERFORMANCE

An analytical study of the maneuverability of 16,000-pound class winged and conventional helicopter configurations is reported in Reference 2. This analytic investigation, which was also sponsored by the Eustis Directorate, U.S. Army Air Mobility Research and Development Laboratory, was conducted

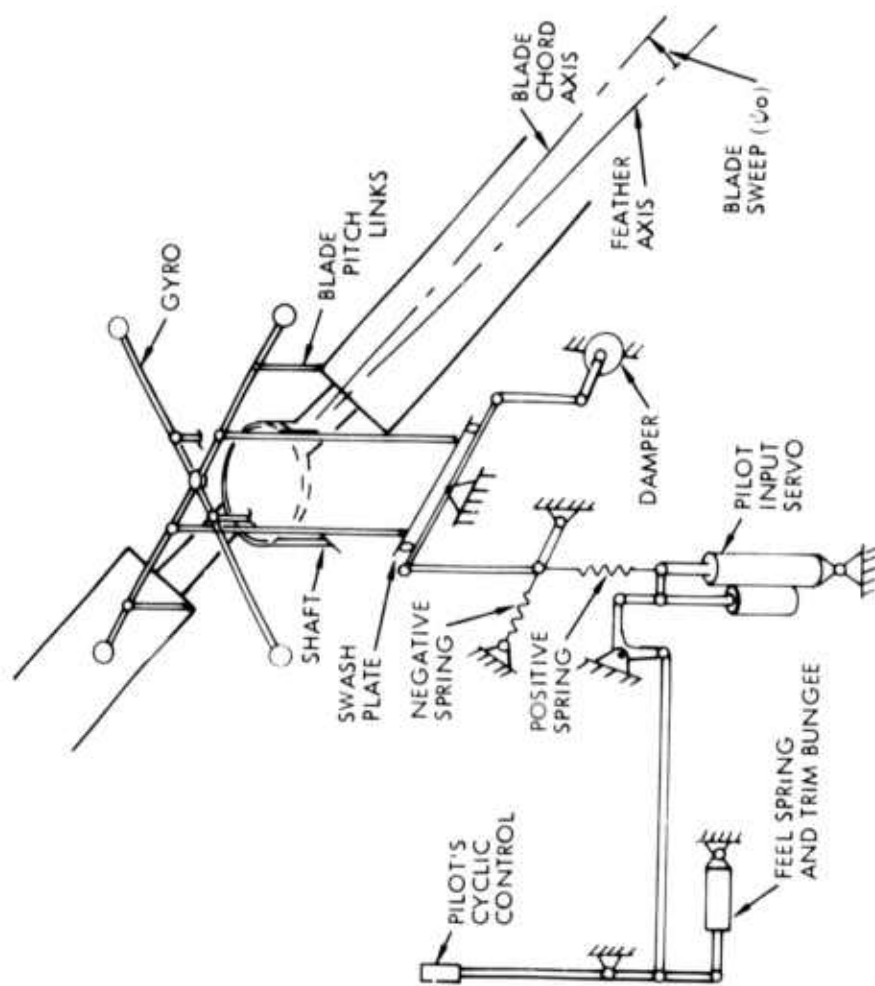


Figure 4. Flap/Feather-Moment Feedback Control System Schematic.

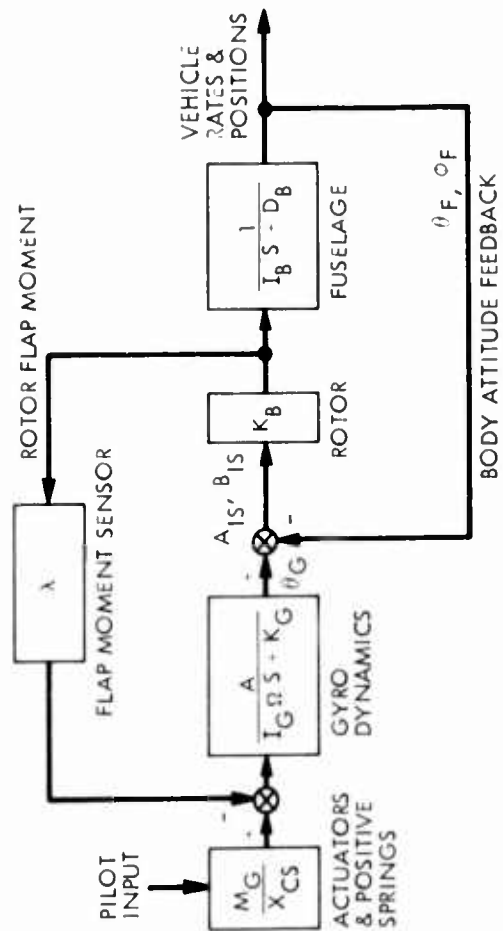


Figure 5. Flap/Feather-Moment Feedback Control System Block Diagram.

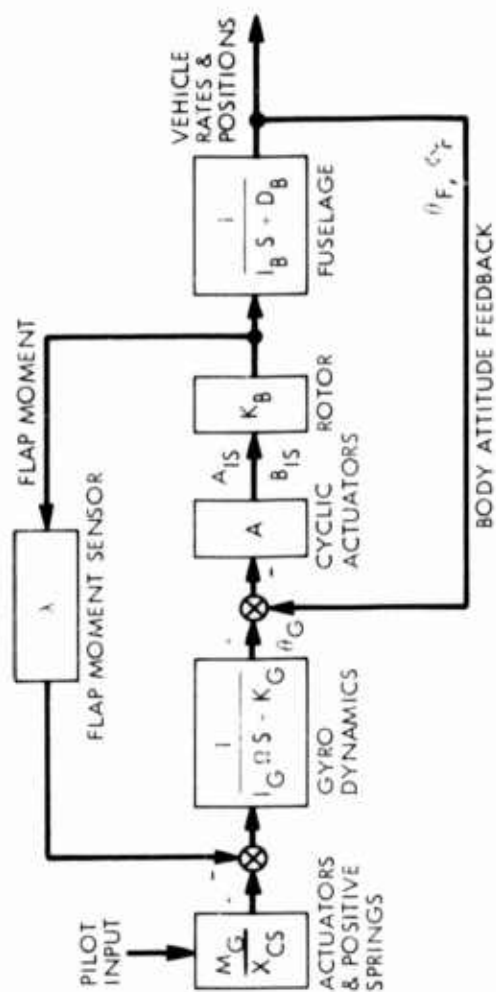


Figure 6. Direct Flap-Moment Feedback Control System Block Diagram.

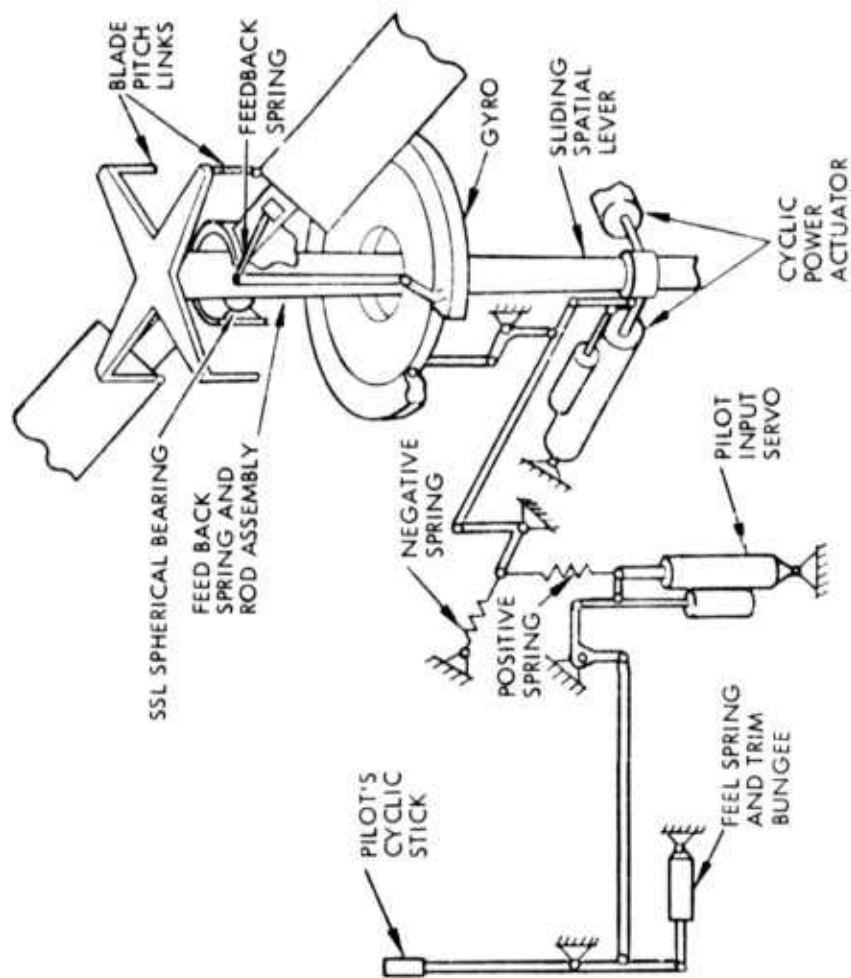


Figure 7. Direct Flap-Moment Feedback Control System Schematic.

under Contract DAAJ02-70-C-0032, using the REXOR simulation program. In this previous investigation, specific transient requirements had to be met for prescribed power and maneuvering levels. The study investigated maneuvering load factors of 1.5, 1.75, and 2.0 g in coordinated turns and symmetrical maneuvers, at flight speeds up to 150 KEAS (167 KTAS), sustaining maximum load factors for 3 seconds during coordinated turns, without excessive speed loss or altitude change.

Subsequent refinements in the analytical description have been incorporated in the current REXOR II program, but basic degrees of freedom and methodology are common to both programs. These refinements were directed at providing an improved control system description and accounting for the structural principal axis position of the blade as it varies with time relative to the spin plane due to collective and cyclic blade angle variations. The effect of these changes has been of some importance in the dynamics area, but their prime benefit has been to contribute to completeness of the description. Results of the referenced study should be unchanged with respect to power, altitude, and velocity relationships as a result of the new program refinements.

#### DYNAMICS

Development of the gyro-controlled hingeless rotor was motivated by the outstanding control and stability achievable with this system. During this development, several dynamic problems were encountered. Through the use of the REXOR analysis, these problems were thoroughly analyzed and understood. They can now be eliminated during design, as they have been in the current (AMCS) version of the AH-56A and proposed advanced configurations.

In an early version of the AH-56A flap/feather-moment feedback system, a 1P x 2P problem resulted from feathering feedbacks due to in-plane motion in conjunction with flapping motions of the blades. The feedback mechanism which caused this problem is only possible with the flap/feathering-moment feedback system. With the direct flap-moment feedback system, as currently employed in the AH-56A/AMCS configuration, the mechanism for this problem is eliminated. This has been demonstrated both on the whirl tower and in extensive flight test programs.

A second problem that was experienced in earlier hingeless rotor configurations was the 1/2P hop problem. Computer studies and flight tests revealed that this problem resulted from insufficient stiffness of the collective system and from an unstable  $\delta_3$  coupling. Successful elimination of the problem has been demonstrated in both flap/feathering-moment feedback and direct flap-moment feedback configurations of the AH-56A. Correlation between REXOR analysis and flight test data was highly successful, providing a high confidence level in selecting suitable design parameters prior to flight for the AH-56A/AMCS and subsequent advanced designs.

Another problem which manifested itself in rigid rotor configurations was that due to a reactionless in-plane blade mode. REXOR analysis, whirl tower testing, and flight testing all demonstrated that this problem is closely associated with pitch-lag coupling and may be encountered in hingeless rotors under very high lift conditions. In this case again, correlation of computer analysis, whirl tower, and flight testing has provided a high confidence level through diagnostic analysis to select suitable parameters and to eliminate the problem or avoid it in new designs. This was demonstrated in the AH-56A program and is documented in Reference 3.

Examples of REXOR program computations and related flight test results for an AH-56A rotor system are shown in Figures 8 through 10. Figure 8 illustrates analytically the effect of blade droop with respect to the feather axis as shown in Figure 3, and rotor lift on reactionless mode damping and chord load. The traces shown at the top of the figure are the analytical time histories of the reactionless mode content of the blade root chord load for three different configurations. The curves at the bottom of the figure show the results of a moving block Fast Fourier Transform (FFT), Reference 4, of these traces. The slope of the moving block analysis results indicate the damping of the mode. These results and additional REXOR results are compared with flight test in the evaluation of reactionless mode damping shown in Figure 9. A summary of the mode as a function of speed from the analysis and flight test is presented in Figure 10.

#### HANDLING QUALITIES

The original purpose of the analysis effort which led to the development of REXOR was to provide a full vehicle model for evaluating rotary-wing aircraft handling qualities. It is for this reason that the full control system is modeled so that the vehicle response to pilot control inputs may be evaluated.

In the development of the AH-56A, REXOR was also used extensively to evaluate handling qualities. In the ICS configuration, a reduction in longitudinal stability due to retreating blade moment stall under high maneuvering load factor conditions limited the flight envelope of the aircraft. This resulted from high feather moments associated with shifts in the aerodynamic center on the retreating blade. This problem again related to the flap/feather-moment feedback system of the earlier rigid rotor control systems under high lift conditions. The mechanism for the problem is eliminated with the direct flap-moment feedback in the present AMCS/AH-56A, as demonstrated by extensive flight testing which increased the demonstrated flight envelope (Figure 11).

An example of the use of the REXOR program in analytic studies which involve the interface of various technical disciplines (dynamics, handling qualities, loads, etc.) is presented in Figures 12 and 13. A blade canopy clearance analysis for the AH-56A was made based on dynamic response of the vehicle to various types of pilot control input. Rotor blade deflection, shaft moments, and body rates of Figure 12 represent typical output data.

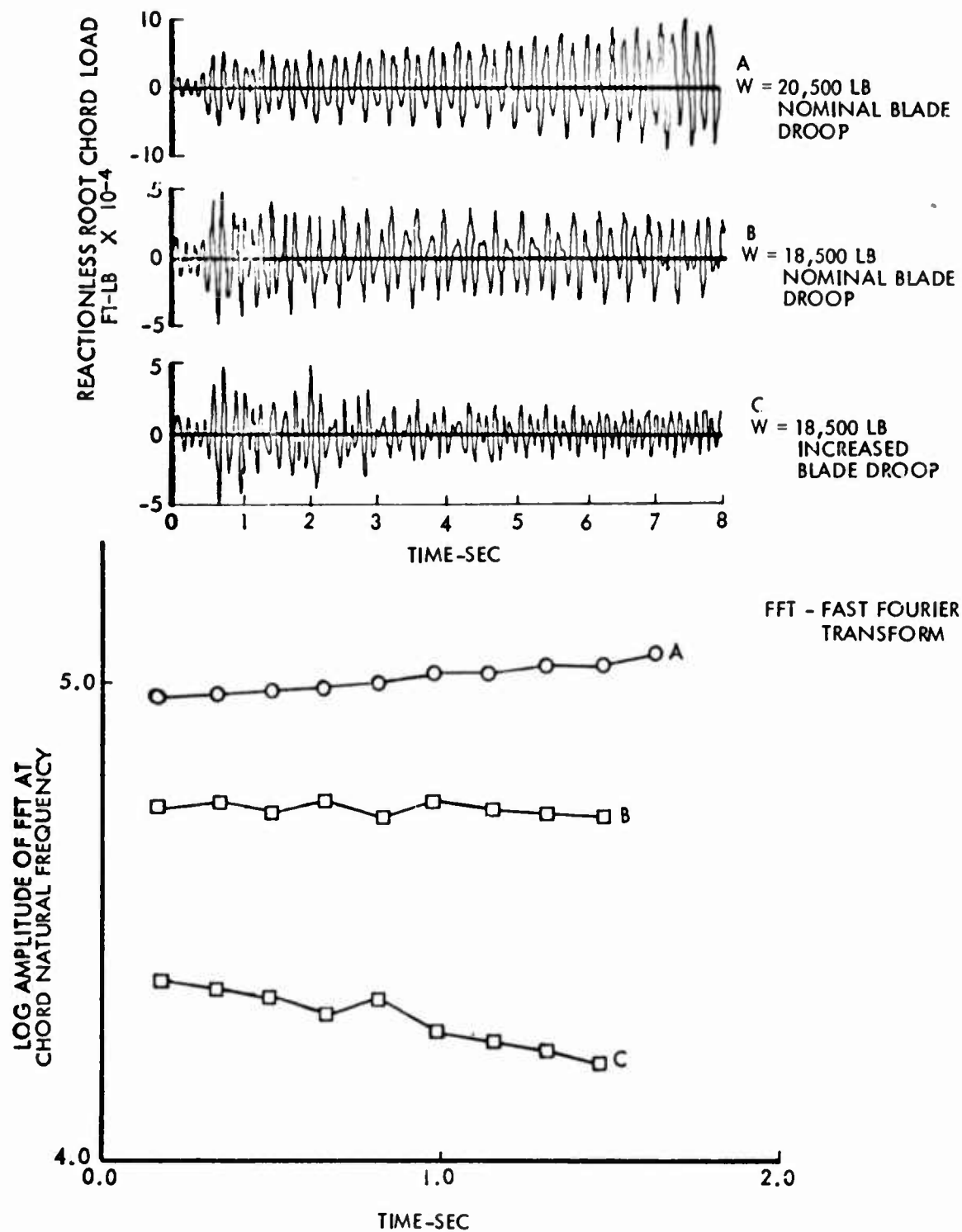


Figure 8. Effect of Blade Droop and Gross Weight on Reactionless Mode Damping and Chord Load Time Histories.



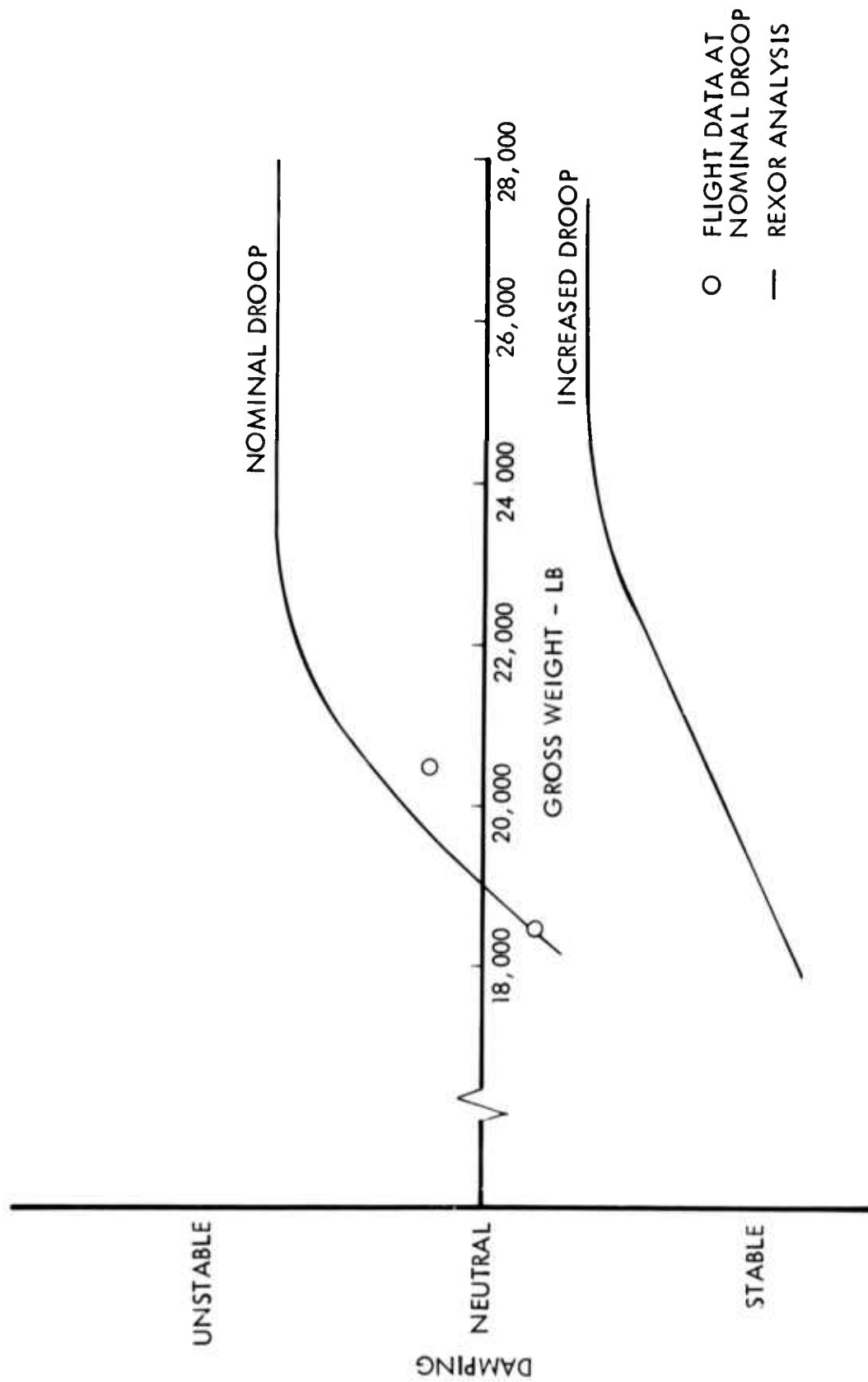


Figure 9. Reactionless Mode Damping vs. Gross Weight.

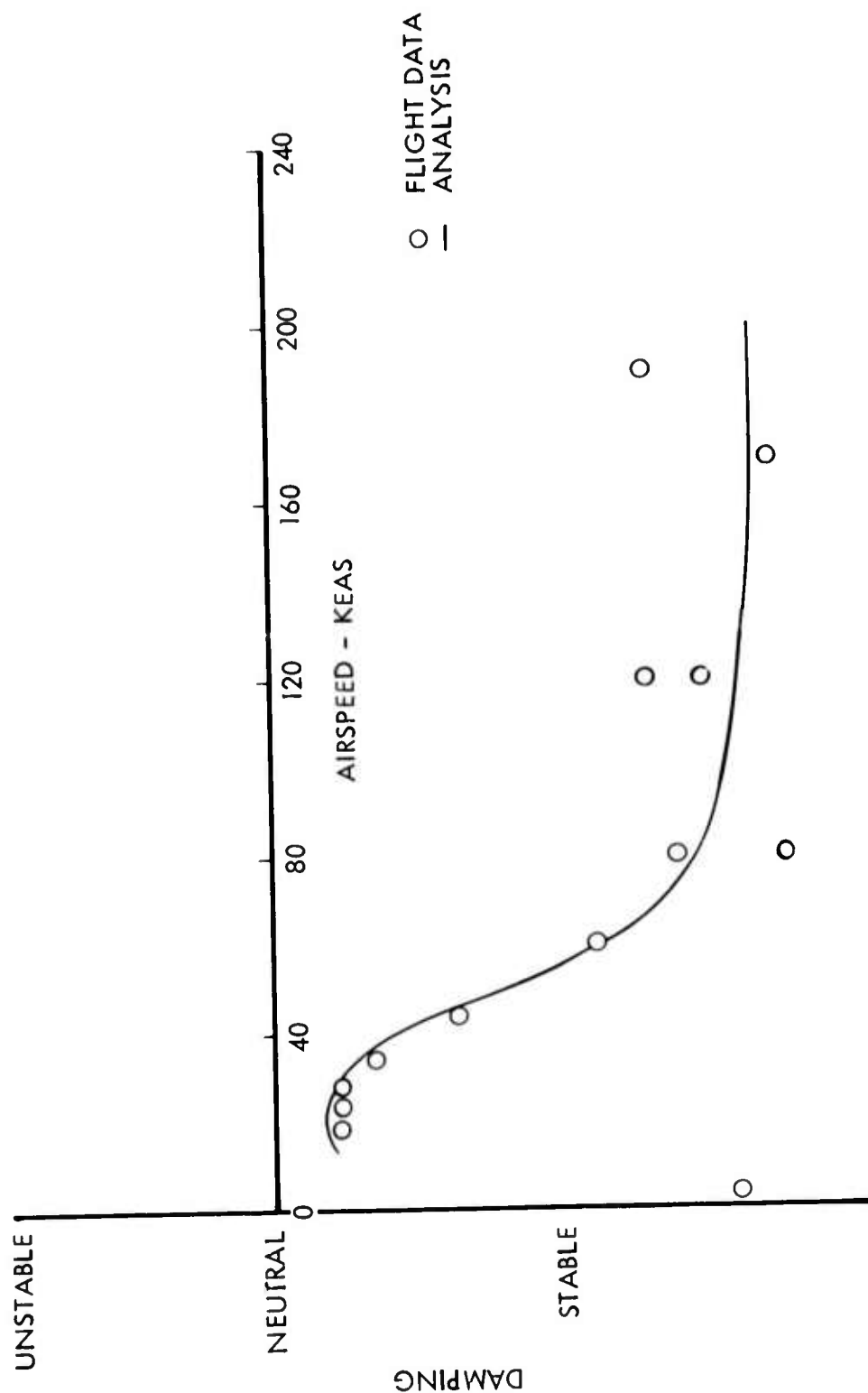


Figure 10. Reactionless Mode Damping vs. Forward Speed.

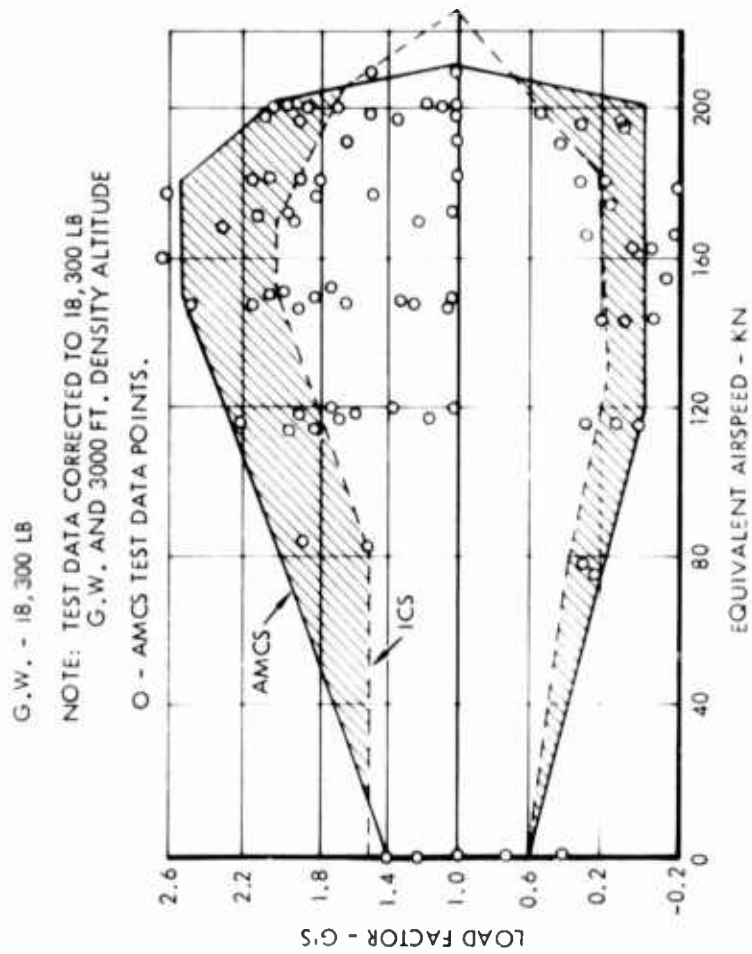


Figure 11. AH-56A ICS/AMCS Flight Envelope Comparison.

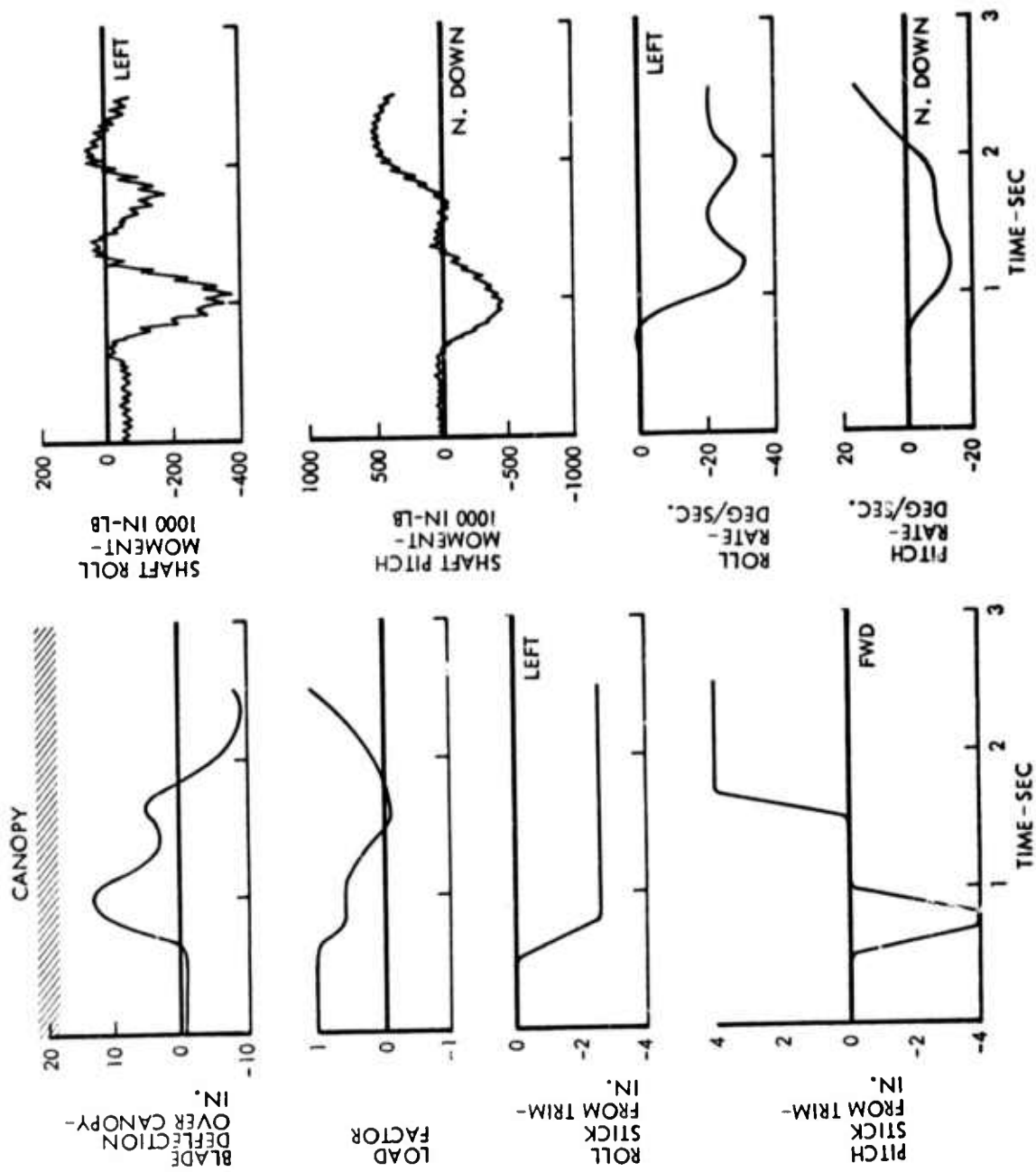


Figure 12. Canopy Clearance Time History - V=200 KTAS.

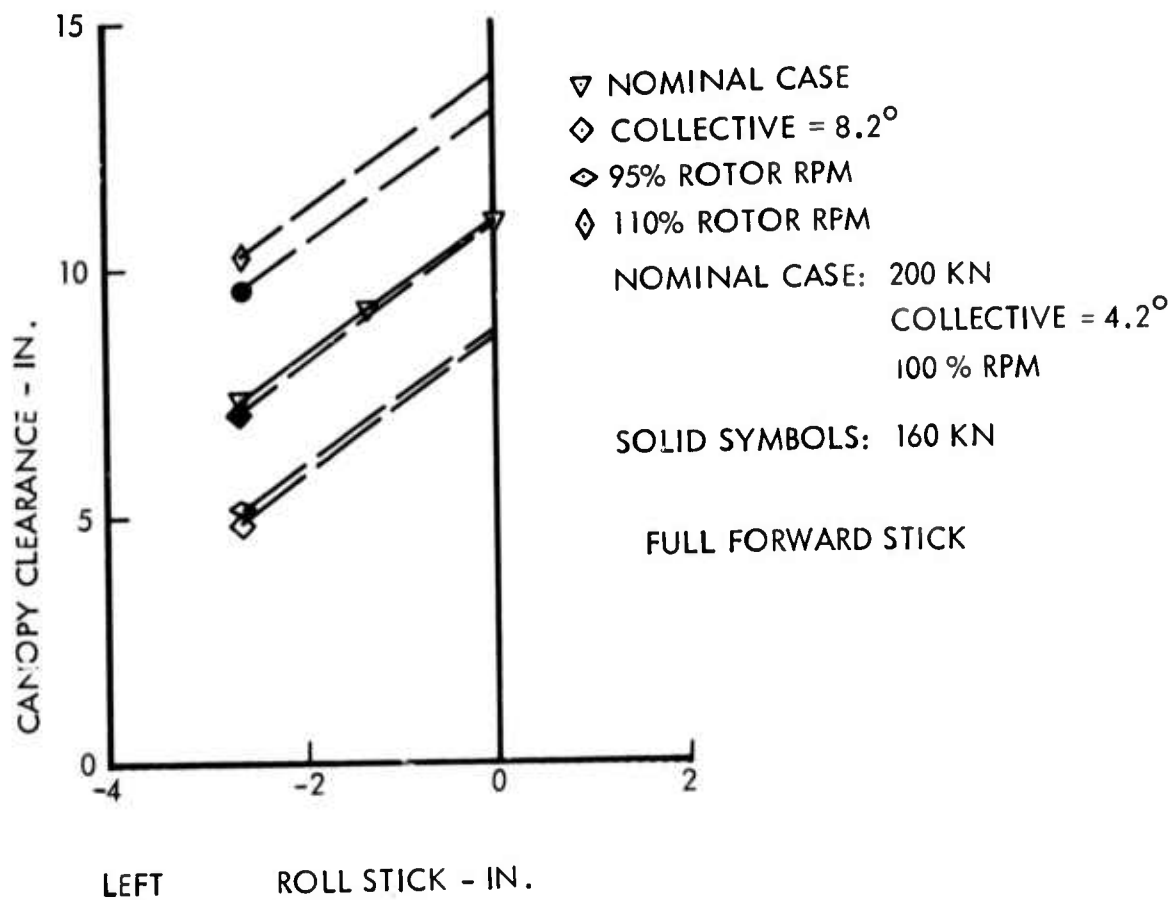


Figure 13. Canopy Clearance Analysis Summary.

Figure 13 shows a summary of the analytic results for pitch and roll control inputs. The relationship of the various technical disciplines to the problem investigated is readily apparent. A more complete discussion of this study is presented in Reference 5.

#### LOADS

It is evident that in these varied applications, a good estimate of rotor transient loads is inherent in the model. The analysis has shown good agreement in defining the practical flight envelope of the various versions of the AH-56A. This study will provide a detailed correlation of the loads capability of the REXOR analysis.

## TECHNICAL APPROACH

The purpose of this study is to correlate a mathematical rotary-wing simulation program (REXOR) with AH-56A and XH-51A flight test data. Primary emphasis is placed on steady and cyclic blade loads during steady and transient maneuvers. Correlation of analytical results with experimental data for both high speed and high load factor conditions offers a basis for analytic extension into regions beyond those measured. The 4,500- and 18,300-pound respective gross weights, 100- to 200-knot flight speed range, and large maneuver envelope of each aircraft establish a quantitative assessment of the limiting factors for a range of aircraft. Factors of prime consideration are root blade loads (chordwise and flap-ping), feathering moments, and blade torsion moments. Distributed blade loads, both chordwise and flapwise, and in particular midspan loads, are also considered to be important in the correlation effort.

Two sets of test data were made available, one set for the AH-56A and one set for the XH-51A (compound mode). Each set consists of a number of steady and transient maneuvers over a defined load factor and speed range. Because of the fundamental differences in the two configurations, each must be considered separately and requires individual adaptation of the REXOR mathematical analysis. The correlation effort was segmented into five tasks:

- Selection and review of test data (AH-56A and XH-51A).
- Reduction of test data to correlation format.
- Modification of REXOR.
- Operation of REXOR to obtain data for correlation.
- Correlation report.

## TEST DATA SELECTION AND REVIEW

Correlation cases were selected to cover the aircraft operational range from which test data are available and to place emphasis on a flight regime of high interest with respect to steady and transient rotor loads. The selected range covers maneuver load factors from 0.2 to 2 g and a speed range from 100 to 200 KEAS. A set of 56 flight test cases was made available and processed for correlation purposes. From a subset of 48, 33 steady-state and 8 transient cases for the AH-56A were correlated with analytic data; for the XH-51A, 4 steady-state and 4 transient cases were correlated.

The correlated static and dynamic cases for the AH-56A as a function of the flight envelope are noted in Figure 14. XH-51A cases are noted in Figure 15. A tabulation of all the flight cases considered for correlation and for which data were tabulated are noted in Table I.

#### REDUCTION OF TEST DATA TO CORRELATION FORMAT

The selected data were reduced from its time history format. Harmonic analysis of blade bending loads, determination of transient rates and accelerations, and extractions of time history records from oscillograph rolls were among the data reduction requirements. Data items utilized for correlation for each of the aircraft are listed in Table II. Time history data were also read and processed to provide data plotted to the same scale as that which is output by the REXOR analysis to allow for a direct comparison.

#### REXOR PROGRAM MODIFICATIONS

To correlate AH-56A maneuver loads, data output consistent with test data measurement items must be available from the REXOR analysis model. Minor modifications to the program were made to provide computational outputs required that had not previously been made available. For example, calculation of blade bending loads at specific blade radial stations consistent with test instrumentation locations was required.

The REXOR program was originally developed for the AH-56A. For the XH-51A correlation, additional modifications were required. The XH-51A turbojet was simulated by a scaled-down version of the AH-56A pusher propeller model. Minor XH-51A control and rotor blade mechanical geometry description changes were also necessary. Blade radial stations for load computations were changed to be consistent with the test configuration of the XH-51A aircraft.

#### REXOR DATA FOR CORRELATION

Operation of the REXOR program to obtain simulated flight data for correlation is straightforward and only requires submittal of input data listed in Appendix III along with the appropriate case data. No modifications of the mathematical model or the computer program were made to achieve or improve the correlation except those required to correctly describe the control geometry as defined above, or to facilitate a data output consistent with the measurement references used in the flight test program. Pilot control inputs were made consistent with flight test measurements. Data management and bookkeeping procedures to control the program are indicated by the arrangement of the data in the appendix.



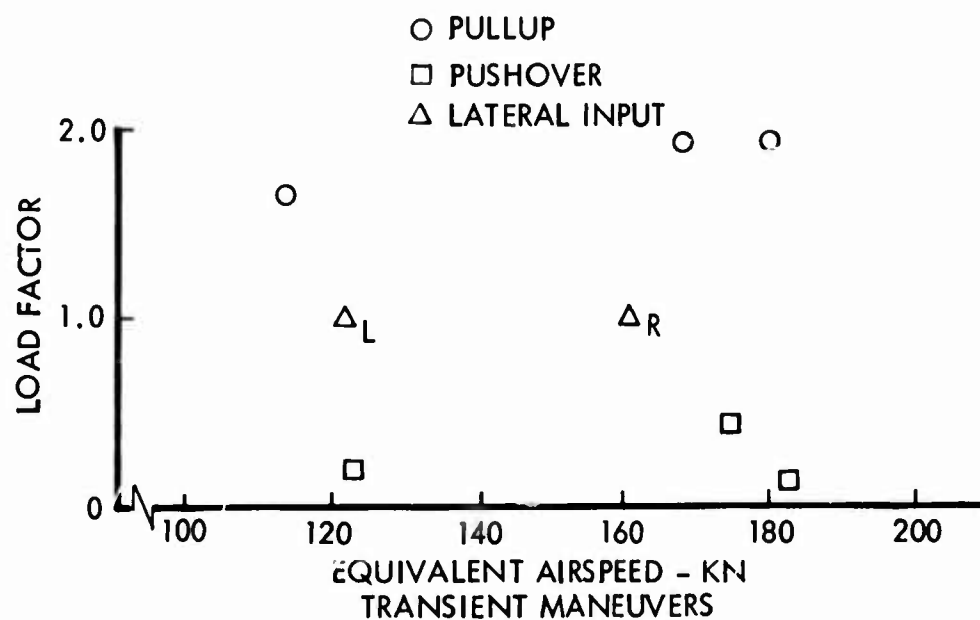
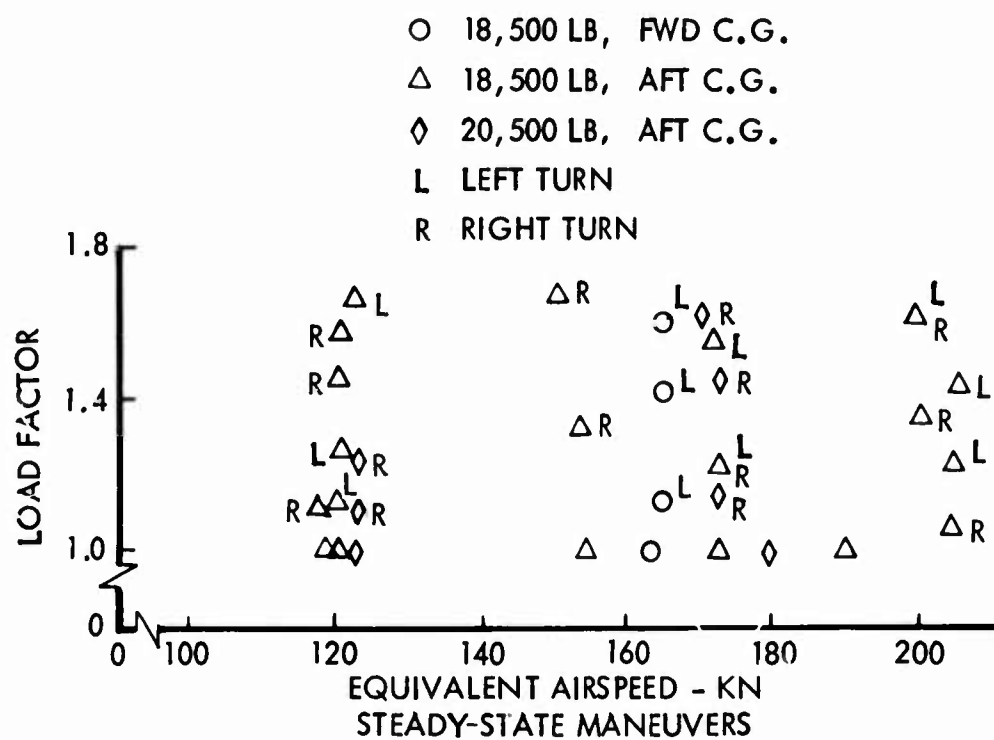


Figure 14. AH-56A Correlation Data Flight Envelope.

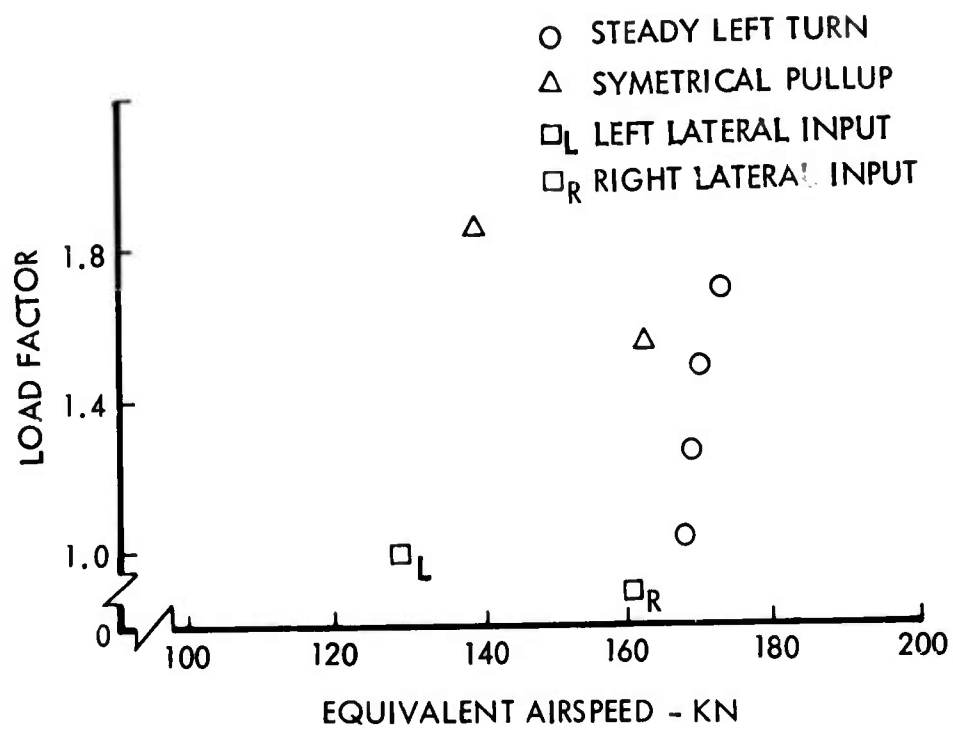


Figure 15. XH-51A Correlation Data Flight Envelope.

TABLE I. SELECTED FLIGHT TEST CASES

| CASE NUMBER | VEHICLE | DESCRIPTION | TEST NUMBER | COUNTER NUMBER | ACCELERATION (g) | RATE OF CLIMB (FT/MIN) | WING SPEED (KTS) | TRIM LOCAL FACTOR | PRESSURE ALTITUDE (FT) | FREE AIR TEMPERATURE (°F) | TIME COLLECTIVE (SEC) | INSTRUMENT WEIGHT (LB) | CENTER OF GRAVITY (IN) | WING CLIP (LB) | WING CLIP (LB) | WING CLIP (LB) |
|-------------|---------|-------------|-------------|----------------|------------------|------------------------|------------------|-------------------|------------------------|---------------------------|-----------------------|------------------------|------------------------|----------------|----------------|----------------|
| 1           | AH-64A  | Forward Flt | 408         | 350            | 15               | 0                      | 99.3             | 1.00              | 900                    | 75                        | 5.5                   | Normal                 | Aft                    | 7,500          | -9,000         | -6,000         |
| 2           | AH-64A  | Forward Flt | 408         | 40             | 11.5             | 0                      | 100.0            | 1.00              | 1,000                  | 75                        | 8.1                   | Normal                 | Aft                    | 8,500          | -10,000        | -11,000        |
| 3           | AH-64A  | Forward Flt | 408         | 145            | 190              | -800                   | 100.0            | 1.00              | 1,500                  | 74                        | 7.0                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 4           | AH-64A  | Forward Flt | 408         | 87             | 101.5            | 0                      | 99.1             | 1.00              | 1,000                  | 75                        | 7.1                   | Normal                 | Forward                | 8,500          | -10,000        | -10,000        |
| 5           | AH-64A  | Left Turn   | 408         | 177            | 15               | -100                   | 99.3             | 1.00              | 1,000                  | 74                        | 7.0                   | Normal                 | Forward                | 9,500          | -10,000        | -10,000        |
| 6           | AH-64A  | Left Turn   | 408         | 48             | 101.5            | -400                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Forward                | 11,000         | -10,000        | -10,000        |
| 7           | AH-64A  | Left Turn   | 408         | 74             | 15               | 0                      | 99.3             | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Forward                | 11,000         | -10,000        | -10,000        |
| 8           | AH-64A  | Right Turn  | 408         | 11             | 101.5            | -700                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Forward                | 11,000         | -10,000        | -10,000        |
| 9           | AH-64A  | Right Turn  | 408         | 107            | 101.5            | -200                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 10          | AH-64A  | Right Turn  | 408         | 136            | 101.5            | -200                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 11          | AH-64A  | Right Turn  | 408         | 108            | 101.5            | -100                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 12          | AH-64A  | Left Turn   | 408         | 400            | 101.5            | -800                   | 99.3             | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 13          | AH-64A  | Left Turn   | 408         | 143            | 101.5            | -100                   | 99.3             | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 14          | AH-64A  | Left Turn   | 408         | 174            | 101.5            | -100                   | 99.3             | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 15          | AH-64A  | Pushover    | 408         | 115            | 101.5            | 0                      | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 16          | AH-64A  | Pushover    | 408         | 94             | 101.5            | 0                      | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 17          | AH-64A  | Left Turn   | 408         | 763            | 101.5            | 0                      | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 18          | AH-64A  | Right Turn  | 408         | 436            | 101.5            | 0                      | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 19          | AH-64A  | Left Turn   | 408         | 770            | 101.5            | -100                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 20          | AH-64A  | Right Turn  | 408         | 940            | 117.5            | -400                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 21          | AH-64A  | Left Turn   | 408         | 779            | 119.5            | -800                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 22          | AH-64A  | Right Turn  | 408         | 945            | 119.5            | -100                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 23          | AH-64A  | Left Turn   | 408         | 745            | 119.5            | -100                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 24          | AH-64A  | Right Turn  | 408         | 784            | 119.5            | -100                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 25          | AH-64A  | Forward Flt | 408         | 461            | 111              | -100                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 26          | AH-64A  | Right Turn  | 408         | 450            | 111              | -100                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 27          | AH-64A  | Right Turn  | 408         | 456            | 111              | -100                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 28          | AH-64A  | Right Turn  | 408         | 301            | 111              | -100                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |
| 29          | AH-64A  | Right Turn  | 408         | 307            | 111              | -100                   | 100.0            | 1.00              | 1,000                  | 74                        | 7.1                   | Normal                 | Aft                    | 1,000          | -10,000        | -10,000        |

TABLE I. Continued.

[illegible]

TABLE II. EXPERIMENTAL DATA CORRELATION PARAMETERS

## AH-56A

1. Main Rotor Fixed Hub Flap Bending Moment at Station 18.
2. Main Rotor Fixed Hub Chord Bending Moment at Station 18.
3. Main Rotor Blade Chord Moment at Station 103.
4. Main Rotor Blade Flapping Moment at Station 130.5.
5. Main Rotor Blade Flapping Moment at Station 174.
6. Main Rotor Blade Chord Moment at Station 174.
7. Main Rotor Shaft Bending Moment.
8. Main Rotor Blade Torsion Moment at Station 131.5
9. Blade Pitch Link Axial Load.
10. Blade Angle.
11. Longitudinal Cyclic Stick Position.
12. Lateral Cyclic Stick Position.
13. Collective Control Position.
14. C.G. Vertical Acceleration.
15. Pitch Rate.
16. Roll Rate.
17. Yaw Rate.
18. Angle of Attack.
19. Sideslip Angle.

## XH-51A

1. Main Rotor Fixed Hub Flap Bending Moment at Station 6.
2. Main Rotor Fixed Hub Chord Bending Moment at Station 6.
3. Main Rotor Blade Chord Bending Moment at Station 45.
4. Main Rotor Blade Flap Bending Moment at Station 115.
5. Main Rotor Blade Angle.
6. Longitudinal Cyclic Stick Position.
7. Lateral Cyclic Stick Position.
8. Collective Control Position.
9. Main Rotor Pitch Link Axial Load.
10. C.G. Vertical Acceleration.

TABLE II. (Continued)

- |                      |
|----------------------|
| 11. Pitch Rate.      |
| 12. Roll Rate.       |
| 13. Yaw Rate.        |
| 14. Angle of Attack. |

#### CORRELATION REPORT

A one-to-one comparison of REXOR results with corresponding AH-56A and XH-51A experimental data is presented in this report. Emphasis has been placed upon comparing blade harmonic loads versus load factor and time history comparisons of loads and responses. A diagram of the scope of study is illustrated in Figure 16. As a part of the report, other areas for future productive correlation activity are also identified.

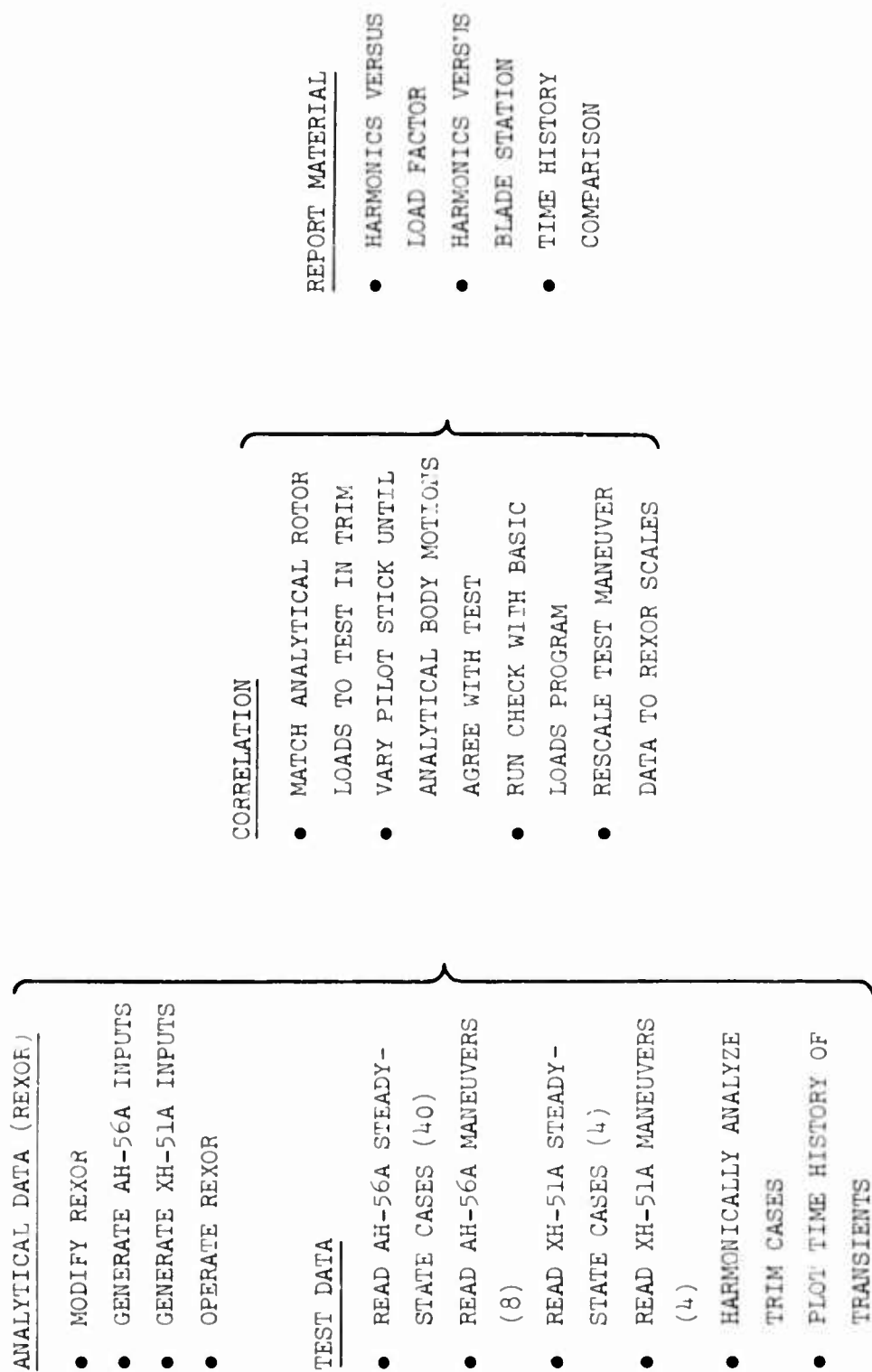


Figure 16. Study Scope.

## REXOR MODEL DESCRIPTION

The model is written for a helicopter which can be conventional, winged or compounded, with a single, four-bladed main rotor. Figure 17 is a computational flow diagram for the REXOR computer program and indicates how the various components are related to one another in the analysis. The motions of the entire helicopter are simulated including a detailed dynamic description of the rotor and control system as well as a conventional, six degree-of-freedom airframe.

The model operates in two modes identified as TRIM or FLY. The TRIM procedure operates directly on main rotor collective, angle of attack, main rotor cyclic, tail rotor collective, and propeller blade angle. TRIM may be established in either a level, climbing, or descending flight path at a steady load factor. Besides free flight, TRIM can be conducted for the fixed-shaft case for whirl tower or wind tunnel analysis. When TRIM is complete, the analysis proceeds to the FLY model where all the degrees of freedom are activated and the helicopter responds for a specified length of time to any input. The pilot simulation can be single- or multiple-control inputs such as steps, pulses, doublet, stick sticks, or other transient inputs within the capability of the control system. Hence, transient loads and the resulting rotor, control, and airframe motions can be generated. Additionally, gust inputs and other types of external excitations can be applied directly to the rotor and airframe.

The aircraft is described dynamically by 28 fully coupled degrees of freedom. These include the airframe with 6 rigid-body degrees of freedom; the swashplate motions with roll, pitch, and heave; the main rotor hub with tilt in roll and pitch due to shaft bending; and with rotor speed due to engine and drive train dynamics. The motion of each main rotor blade is described by three coupled bending modes with flapwise and lagwise components and an elastic feathering or pitch horn bending degree of freedom between the swashplate and the blade. The four independent blades have a total of 16 degrees of freedom, making a grand total of 28 fully coupled dynamic degrees of freedom. In addition to these coupled degrees of freedom, there is a first torsion mode for each blade. This mode is included either as a dynamic mode or as a massless torsion response to blade torsion loads through a first-order lag, depending on the type of analysis being performed.

The three rotating natural modes for each blade are obtained from the Lockheed Rotor Blade Loads program. This computer program consists of an aerodynamic performance-trim analysis of an isolated rotor that is coupled



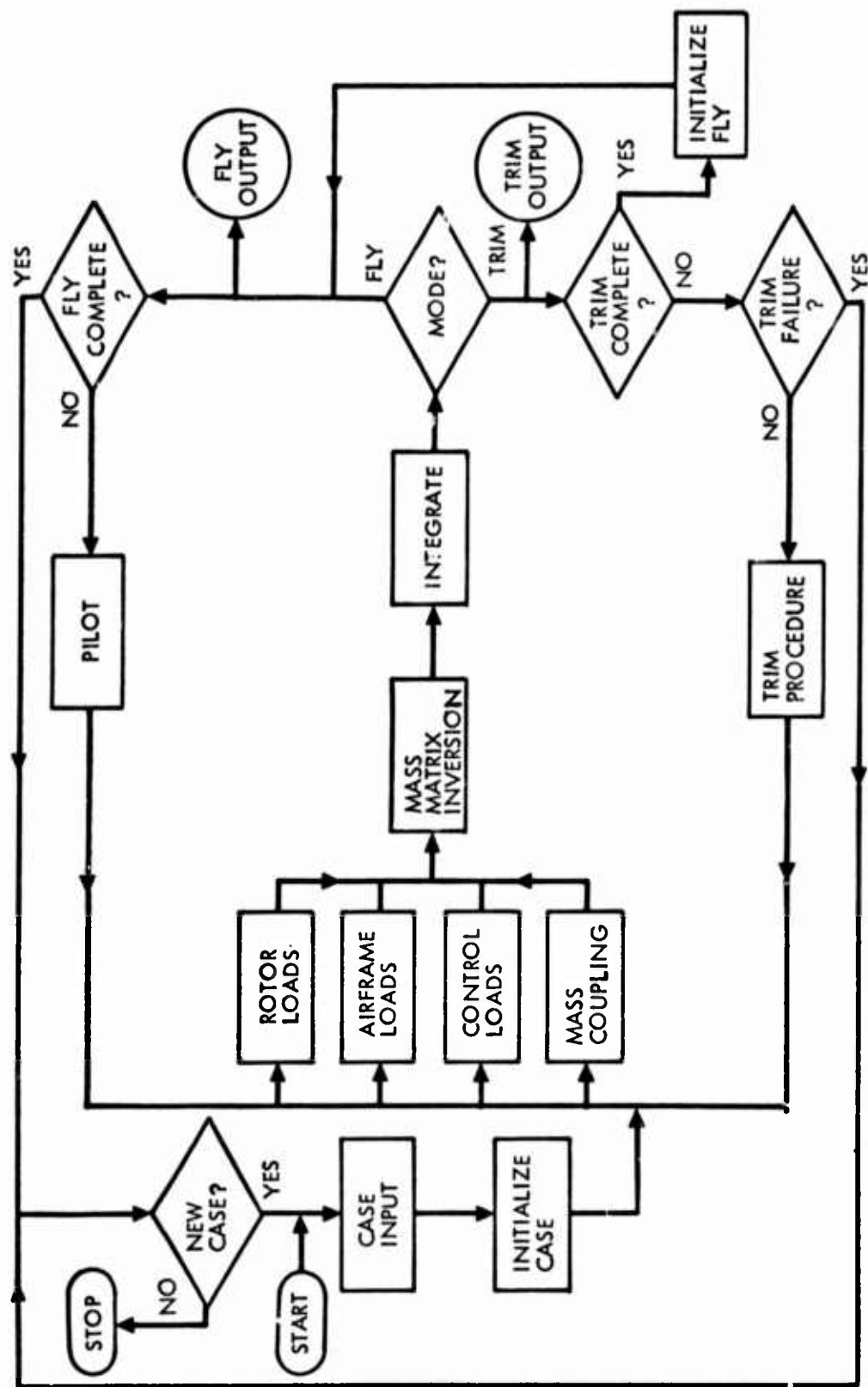


Figure 17. REXOR Computational Flow Diagram.

with the dynamic response of the blades. A relaxation type of iterative procedure is employed between the aerodynamics and the structural response of the blades. Converged trim characteristics of the rotor that are consistent with the blade mode shape and loads are obtained. The first three modes of the cantilevered rotating beam which can be characterized as the first-flap, first-in-plane, and second-flap bending modes are obtained from this principal axis coupled finite element analysis. The program structurally models the rotating blade, using up to 75 discrete span-wise lumped parameter loading stations with the flapwise-chordwise response fully coupled.

The structural description is generalized in that two separate beams in a centrifugal force field are used to describe one arm of the rotor. The two beams represent the feathering blade, and the fixed hub which supports the blade. Each beam is free to deform independently of the other except for the constraint at the points of attachment to each other (feathering bearings). These points must have the same spatial displacement. A provision in the description permits the consideration of bearing support elasticity at the feather bearing locations as a function of the radial reaction forces acting on the bearings. The structural modeling accommodates either concentric hub and blade or door hinge blade concepts, and either compression-torsion or tension-torsion packs for blade retention with the appropriate load transfers. The elastic response of the blade considers the structural coupling between flapwise and chordwise bending due to collective pitch and the built-in blade twist.

The natural frequencies and mode shapes are used directly as basic input data for the REXOR program. The number of blade and hub stations is, however, reduced to facilitate computational times. Thirteen inertial stations and eleven aerodynamic stations (the two root stations are not loaded) are used to represent each rotor blade for this correlation study although any number up to 20 may be used. The highest frequency mode of the rotating natural modes used in the study is approximately 2.6P at nominal rotor rpm for both the AH-56A and the XH-51A. As a result, the 3rd harmonic and all higher harmonic loadings are not as well represented due to the use of only three modes. The Rotor Blade Loads program has also been used to provide a basis of comparison for REXOR correlation. In some cases, Rotor Blade Loads analysis data is included in this report to show the limitations of the REXOR structural description on loads estimation.

The dynamic equations of motion are written in matrix form as:

$$- [A(q, t)] \{\ddot{q}\} + \{G(\dot{q}, q, t)\} = 0$$

where  $[A]$  is a matrix of generalized mass elements, which is a function of the displacements of the generalized coordinates,  $q$ , and the time,  $t$ ;

$\{\ddot{q}\}$  is a column matrix of accelerations of the generalized coordinates; and  $\{G\}$  is a column matrix derived from the Lagrangian energy functions, dissipation functions and generalized forces, and contains all of the linear and nonlinear dynamic and aerodynamic terms.

The equations of motion are solved in the time domain at rotor azimuth angle increments small enough to provide computationally stable results for the highest frequency mode present. The analysis is fully coupled and nonlinear, with the generalized forces and masses being automatically generated at each time point; application of the above equation assures complete force equilibrium of the system at each instant.

The blade motions are in terms of modal displacements where the centrifugal and structural stiffness terms are separately defined. This permits a description of the periodic reorientation of the structural and centrifugal springs due to cyclic blade angle. Additionally, the blade response includes motions due to simultaneous consideration of blade feathering and the blade element locations relative to the feather axis due to precone, sweep, droop geometry, and elastic blade deflections. The feathering and shaft moments include all of the nonlinear terms associated with coupled flapping and in-plane loads acting on the combined static and elastic displacements of the blade and shaft.

The equations of motion are obtained by application to each of the generalized coordinates  $q_r$ , of the following equation, which is a form of the Lagrangian energy expression.

$$\sum_{i=1}^n (F_{x_i} - m_i \ddot{x}_i) \frac{\partial x_i}{\partial q_r} + \sum_{i=1}^n (F_{y_i} - m_i \ddot{y}_i) \frac{\partial y_i}{\partial q_r} + \sum_{i=1}^n (F_{z_i} - m_i \ddot{z}_i) \frac{\partial z_i}{\partial q_r} + \frac{\partial U}{\partial q_r} = 0$$

$F_{x_i}$ ,  $F_{y_i}$ , and  $F_{z_i}$  are forces acting on  $n$  elements of mass,  $m_i$ , with orthogonal coordinates  $x_i$ ,  $y_i$  and  $z_i$ . The generalized potential,  $U \equiv U(q_r, \dot{q}_r)$  provides additional generalized forces not included by  $F_{x_i}$ ,  $F_{y_i}$ , and  $F_{z_i}$ . The elemental accelerations, velocities, and displacements are derived using conventional vector analysis techniques.

The aerodynamic description comprises a rotor inflow model, nonlinear steady and unsteady blade element airloads, nonlinear body airloads, rotor and

airframe airflow interference, and airloads from the tail rotor and the propeller. The rotor inflow model is an empirical modification to uniform downwash based on data from Reference 6, with adjustments for shaft moments. The inflow velocity at station  $x$  of a blade of radius  $R$  and azimuth  $\Psi$  has the form:

$$w_i = \bar{w}_i \left\{ 1 + \frac{x}{R} [f(X_u) \cos \Psi + f(X_v) \sin \Psi] \right\} + \frac{x}{R} (\bar{p}_i \sin \Psi + \bar{q}_i \cos \Psi)$$

where  $\bar{w}_i$  is the uniform momentum inflow velocity,  $f(X_u)$  and  $f(X_v)$  are functions of longitudinal and lateral wake angles, and  $\bar{p}_i$  and  $\bar{q}_i$  are first harmonic inflow components that are functions of rotor rolling and pitching shaft moments and translational velocity.  $\bar{w}_i$ ,  $\bar{p}_i$ , and  $\bar{q}_i$  are filtered with first-order lags which represent the delay in establishing a new inflow pattern following a change in rotor loading.

The blade section lift, drag, and pitching moment are nonlinear functions of the section thickness ratio and camber, the angle of attack, and the Mach number as determined from a table lookup routine. Aerodynamic loads due to pitch and plunge are quasi-steady and are of the general form found in Reference 7, with the Theodorsen deficiency function set to 1.0. Stall hysteresis is also included in a form similar to that described in Reference 8. This dynamic stall was not available at the beginning of this study and therefore, was not used.

The aircraft control system simulates the pilot controls operating through a servo boost on all control axes. Gearing and phasing are provided in the cyclic control path. The servos are simulated by first-order lags with rate limits. Soft and hard stops are modeled. The dynamic equations include the response of blade feathering to swashplate springs and blade loads.

The input data are printed as a card listing and also as a listing grouping like inputs which give the FORTRAN symbol as well as the value. A high degree of flexibility is provided by making each input an element of one large array of dimension 3000. Changes in either the master, the overrides to the master, or case data are minimized. The standard output format gives time history plots of up to 40 parameters in the TRIM mode and 60 in the FLY mode. Automatic scaling is provided on all plots. Output data are also tabulated at the start and end of both TRIM and FLY modes. The program can provide plots of the blade loads over the last revolution of trim on an expanded time scale. These loads are harmonically analyzed and the components tabulated. Other capabilities are included such as the generation of linear models with or without periodic coefficients for solution by linear or Floquet eigenvalue routines, Reference 9, or Fast Fourier Transform techniques which permit identification of frequency and damping during transients, Reference 4.

## MODIFICATION AND OPERATION FOR STUDY

To minimize computation time, several degrees of freedom not required to define the test vehicle were eliminated. These included the shaft tilt degrees of freedom for the AH-56A and XH-51A configurations, and the rotor speed degree of freedom for the XH-51A helicopter due to a lack of data concerning its engine dynamic characteristics.

Modifications to the modeling of the physical systems were made to accommodate the XH-51A helicopter. The jet thruster was modeled as a scaled-down version of the AH-56A propeller. This simplification has a minor effect on body accelerations and a negligible effect on blade loads. Tail rotor height and thruster lateral offsets were added to accommodate the XH-51A configuration.

A number of other modifications were made to obtain the desired output capability and to save computational time. The blade loads plot time history capability in the FLY mode was expanded. A harmonic analysis subroutine was created, and the output was converted to standard engineering units and signs. TRIM SAVE data were made available to save computing time in the TRIM mode. One blade trim procedure was activated for the AH-56A configuration to save computer time in the TRIM mode.

Harmonic analyses are conducted during the last revolution in TRIM. In order to compute true equilibrated blade loads, however, a modification to the program was required due to the computational sequence used in the REXOR program. For a given time point, the accelerations from the previous time are integrated to provide the current velocities and displacements. Accelerations at the last time point and the current velocities and displacements are then used to compute loads and "generalized forces." The accelerations at the current time point are found by multiplying the generalized forces by the inverted mass matrix to give delta accelerations which are added to the accelerations from the previous time to give the true current acceleration.

Loads computed up to this point are not completely accurate in that they are based upon current velocities and displacements but previous time accelerations. Therefore, the program was modified to compute internal loads using all current values of accelerations, velocities, and displacements before proceeding to the next integration step for the next time velocities and displacements. This loads computation is only implemented during the harmonic analysis cycle to conserve computation time.

## DESCRIPTION OF TEST VEHICLES

As a basis for correlation of the loads evaluation capability of the REXOR analysis, flight test data from two test aircraft were used: The AH-56A compound helicopter and the XH-51A compound helicopter.

The AH-56A data were obtained on the Lockheed S/N 1009 in its Improved Control System (ICS) configuration. The XH-51A compound helicopter is a modified XH-51A helicopter (Lockheed S/N 1002), which was developed under contract to the U.S. Army Aviation Materiel Laboratories to study the high-speed compound helicopter flight regime. The results of this research have been reported in Reference 10. This section contains a brief description of these test aircraft.

### AH-56A COMPOUND HELICOPTER

The AH-56A is a two-place, high-performance, compound attack helicopter powered by a single General Electric T64-GE-716 turboshaft engine. A fixed wing unloads the main rotor and assumes the greater portion of the total aircraft lift at high speeds. Longitudinal thrust is provided by a three-bladed pusher propeller. Photographs of the test vehicle are presented in Figures 18 through 20. A three-view drawing is presented in Figure 21.

The low aspect ratio wing consists of left and right panels which are mounted to the sponsons low on the fuselage. The wings are trapezoidal in planform, having a total area of 196 square feet. The wing cross section is a convex upper surface and a concave lower surface airfoil tapering from 12-percent thickness at the root to 8-percent thickness at the tip.

The horizontal stabilizer is mounted to the aft end of the fuselage. The two panels of the horizontal stabilizer are basically trapezoidal in planform. The trailing edge of both panels is unswept. The left panel is contoured from a symmetrical airfoil with a cutoff trailing edge ("bobtailed"). The right panel also is derived from a symmetric airfoil with the aft third of the chord deflected downward 2.84 degrees.

The vertical stabilizer is ventrally mounted near the aft end of the fuselage. It is mounted on the fuselage centerline with no incidence relative to the fuselage centerline. The fin airfoil section is symmetrical.



Figure 18. AH-56A, S/N 66-8834 (1000), Test Configuration, Front View.



Figure 19. AH-56A, S/N 66-8834 (1000), Test Configuration, Front Quarter View.

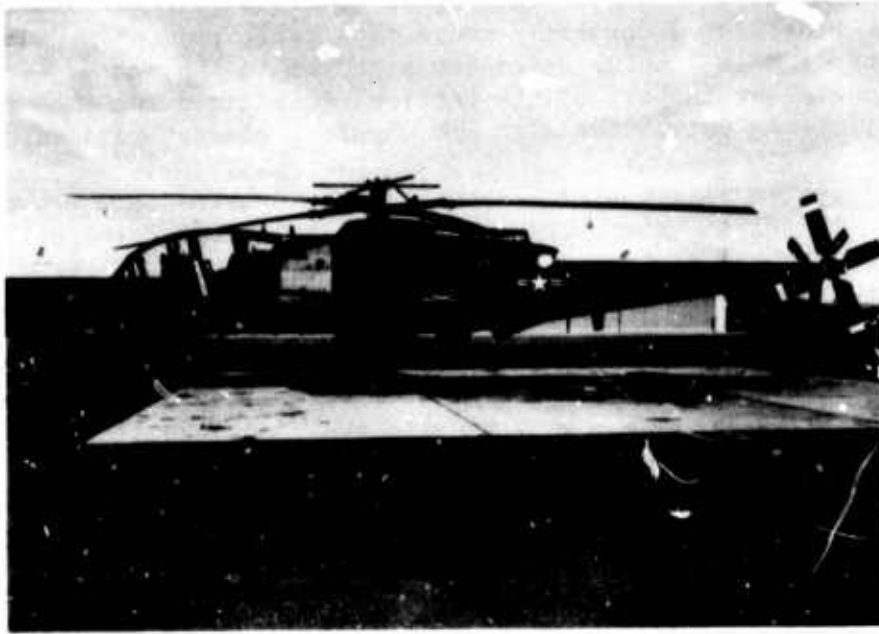


Figure 20. AH-56A, S/N 66-8834 (1009), Test Configuration, Side View.



The engine is installed in the upper mid-fuselage with inlets on both sides of the main rotor mast. The engine exhausts over the aft fuselage with the wake deflected upward by means of a tailpipe design feature. The retractable main landing gears are attached to the sponsons. The tail wheel is mounted at the tip of the vertical stabilizer and also retracts. Table III lists in detail the airframe physical characteristics.

The dynamic system is comprised of the main rotor, the tail rotor and the propeller. The rotating components are integrally connected with no clutching provisions except at the engine where a sprague-type clutch separated the rotating system from the engine during autorotations.

The four-bladed hingeless main rotor is centered on fuselage station 300 and waterline 165.3. The blades are rectangular in planform. Each blade is attached to a movable hub at blade station 70 (blade station 0 was defined to be at the hub center). Each movable hub is attached to a fixed hub with feather bearings located at blade stations 35 and 60. The centrifugal load, rather than passing through the bearings, is reacted through a tension-torsion pack which attached to the movable hub at station 30 and the fixed hub at station 12. The blade airfoil section is cambered, with thickness tapered from root to tip. Typical airfoil sections are illustrated in Figure 22. The blade in the ICS configuration is swept forward 4 degrees and drooped down 1 degree 57 minutes at station 70. Additional droop is provided by 23 minutes of feather bearing offset in the fixed hub and 50 minutes of feather bearing offset in the movable hub, resulting in a total of 3 degrees 10 minutes of blade droop with respect to the feather axis. Figure 23 schematically illustrates blade sweep and droop and the configuration relationships of the blade, movable hub, fixed hub, feather bearings, and tension-torsion pack.

The tail rotor is mounted on the tip of the left stabilizer. The four-bladed teetering tail rotor is centered on fuselage station 658.5, waterline 114.5 and buttline 72 left. The constant chord airfoil section has a constant thickness over a large percentage of the chord and a droop nose. The airfoil section is shown in Figure 22. The direction of rotation is in the sense of opposing the main rotor downwash (i.e., upper blade rotates aft).

A three-bladed Hamilton Standard 1311 GE 30/11FA 10A4-0 propeller is mounted at the aft end of the fuselage. The propeller thrust is controlled by variation of the collective blade angle at essentially constant speed (i.e., beta prop). The airfoil sections are NACA 16-series sections over the outer span and NACA 64-series sections in the spinner region, with the transition occurring between approximately 38 and 49 percent of span.

The shaft moment capability available with Lockheed's hingeless rotor design makes possible ample roll and pitch control with main rotor cyclic feathering. Elevator, aileron, or rudder provisions are not incorporated

AREA (SQ FT) 70.00  
 ASPECT RATIO 4.05  
 TAPER RATIO 5  
 SPAN (IN.) 203  
 ROOT CHORD (IN.) 66.5  
 TIP CHORD (IN.) 33.25  
 M.A.C. (IN.) 51.9  
 AIRFOIL SECTION ROOT TIP  
 INCIDENCE ROOT TIP  
 MAC  
 DIHEDRAL SWEEP  
 HORIZONTAL TAIL  
 SPAN (IN.) 108.00  
 CHORD (IN.) 26.4  
 AIRFOIL SECTION  
 INCIDENCE TO FRL 25°

NACA 23012  
 NACA 23012  
 9° FROM WL  
 9° FROM WL  
 .0° AT TE  
 .0° AT 25° C

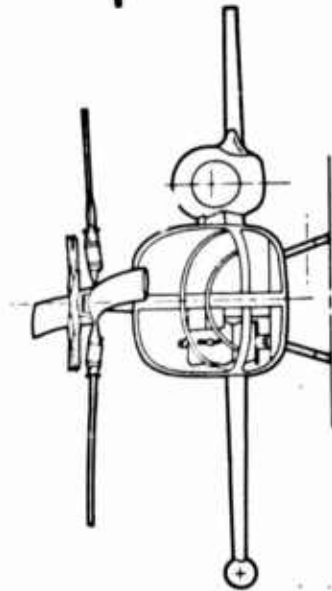
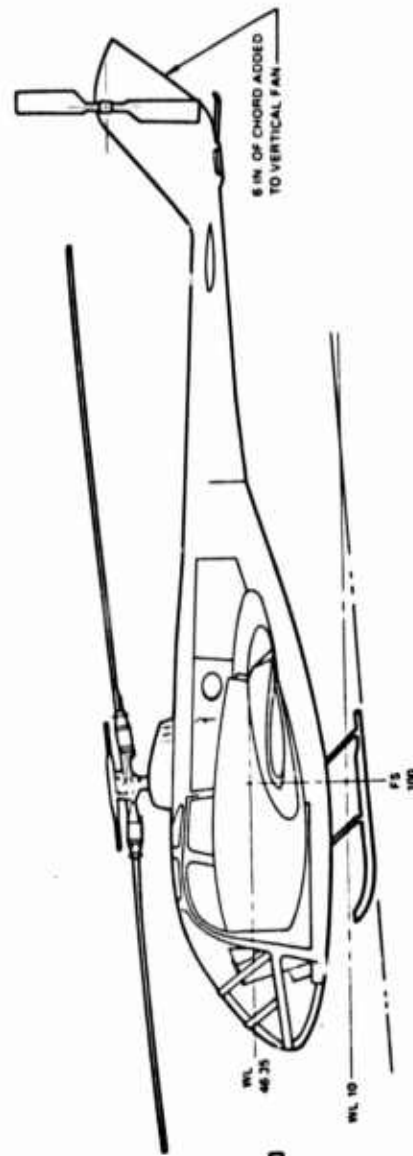
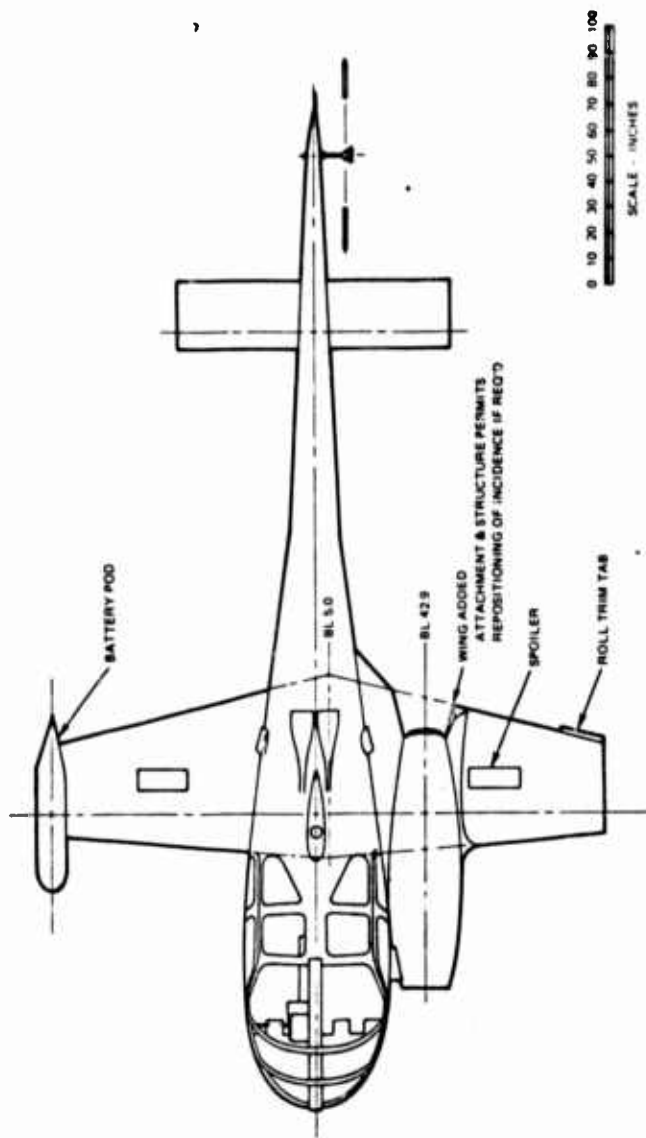


Figure 21. AH-56A Three View (General Arrangement)

|                  |      |              |
|------------------|------|--------------|
| AREA (SQ FT)     |      | 70.00        |
| ASPECT RATIO     |      | 4.05         |
| TAPER RATIO      |      | .5           |
| SPAN (IN.)       |      | 2.03         |
| ROOT CHORD (IN.) |      | 66.5         |
| TIP CHORD (IN.)  |      | 33.25        |
| M.A.C. (IN.)     |      | 51.9         |
| AIRFOIL SECTION  | ROOT | NACA 23012   |
|                  | TIP  | NACA 23012   |
| INCIDENCE        | ROOT | .9° FROM WL  |
|                  | MAC  |              |
|                  | TIP  | .9° FROM WL  |
| DIHEDRAL         |      | .0° AT TE    |
| SWEEP            |      | .0° AT .25 C |

#### HORIZONTAL TAIL

|                  |           |
|------------------|-----------|
| SPAN (IN.)       | 108.00    |
| CHORD (IN.)      | 26.4      |
| AIRFOIL SECTION  | NACA - 15 |
| INCIDENCE TO FRL | .25°      |

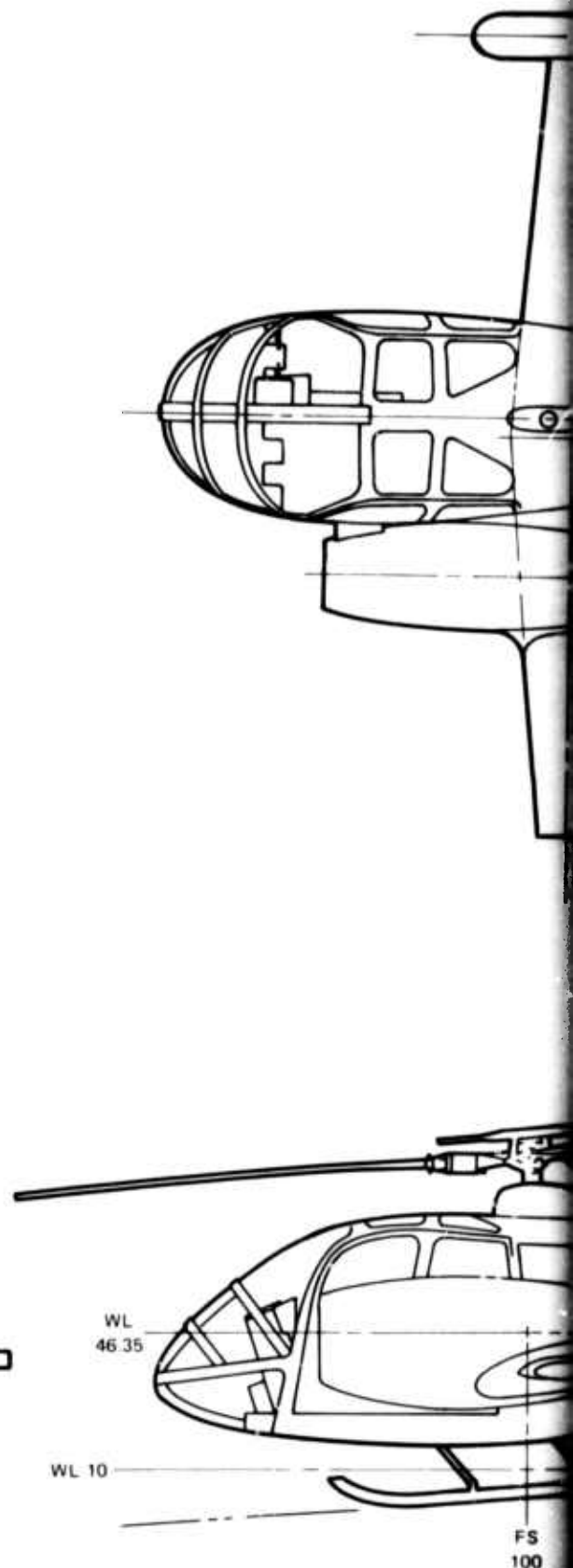
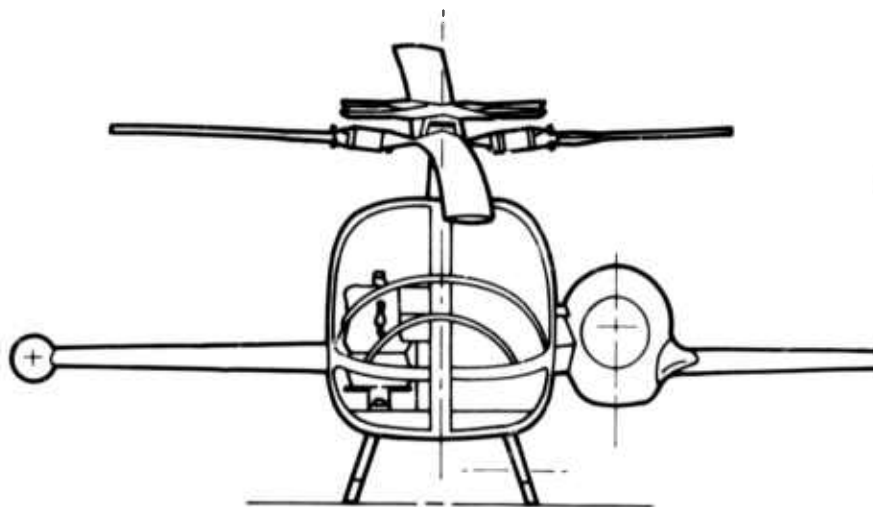


Figure 21. AH-56A Three View  
(General Arrangement)

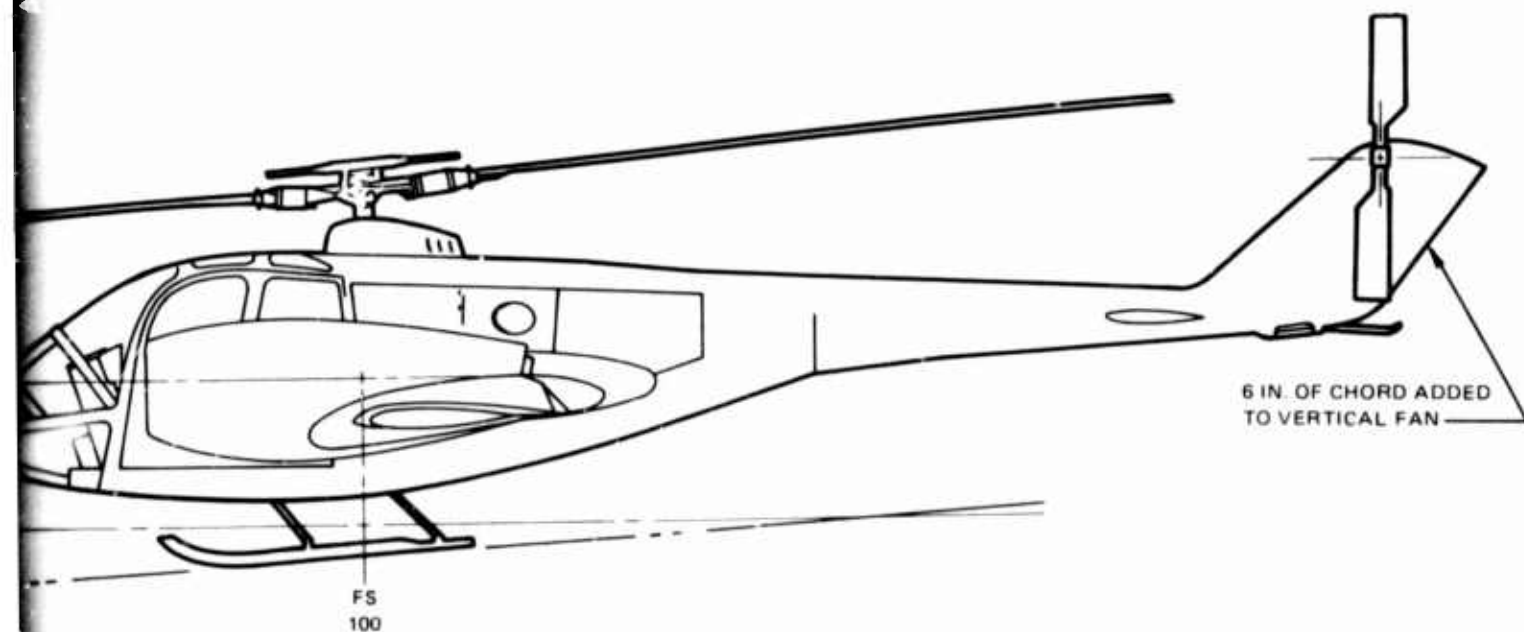
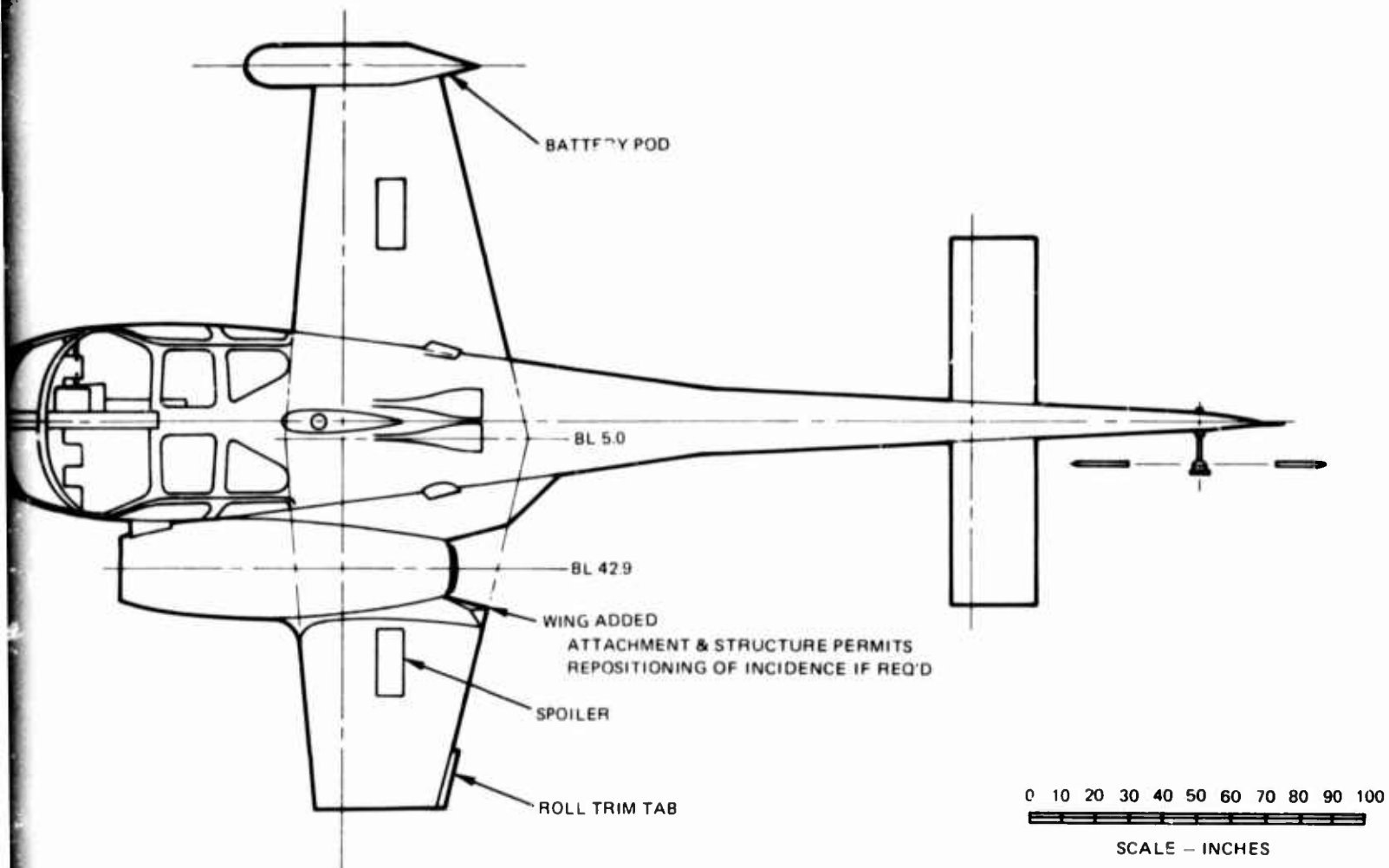


TABLE III. CHARACTERISTICS OF THE AH-56A ICS AIRFRAME  
AERODYNAMIC SURFACES

WING

Airfoil:

|                                |                     |
|--------------------------------|---------------------|
| Root                           | AH-56A 12%          |
| Tip                            | AH-56A 8%           |
| Area                           | 195 ft <sup>2</sup> |
| Span                           | 26.7 ft             |
| Aspect Ratio                   | 3.66                |
| Mean Aerodynamic Chord         | 7.6 ft              |
| Fuselage Station at 25% M.A.C. | 308.2               |
| Taper                          | 0.50                |
| Dihedral                       | 5°                  |
| Root Chord Incidence:          |                     |
| Left Wing                      | 11° 52'             |
| Right Wing                     | 12° 58'             |
| Twist Root to Tip:             |                     |
| Left Wing                      | -3° 06'             |
| Right Wing                     | -3° 02'             |

HORIZONTAL STABILIZER

Airfoil:

Right Panel:

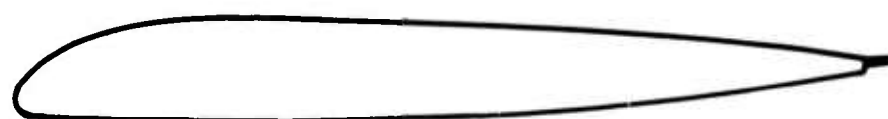
|                |  |
|----------------|--|
| Root, B.L. 0   | NACA 0018 (MOD)                              |
| Tip, B.L. 65.0 | NACA 0012 (MOD)                              |
| Left Panel     | NACA 0018<br>(Highly modified,<br>bobtailed) |

Area:

|   |                       |
|---|-----------------------|
| Left Side                               | 16.25 ft <sup>2</sup> |
| Right Side                              | 15.58 ft <sup>2</sup> |
| Total                                   | 31.83 ft <sup>2</sup> |
| Span, B.L. 65.0 Left to B.L. 65.0 Right | 10.83 ft <sup>2</sup> |

TABLE III. (Continued)

|                                       |                      |
|---------------------------------------|----------------------|
| Aspect Ratio                          | 3.68                 |
| Mean Aerodynamic Chord:               |                      |
| Left Side                             | 3.07 ft              |
| Right Side                            | 2.95 ft              |
| Average                               | 3.01 ft              |
| Fuselage Station at 25% M.A.C.        |                      |
| Left Side                             | 637.38               |
| Right Side                            | 636.98               |
| Average                               | 637.18               |
| Taper:                                |                      |
| Left Side                             | 0.583                |
| Right Side                            | 0.568                |
| Average                               | 0.576                |
| Dihedral                              | 0°                   |
| Twist                                 | 0°                   |
| Deflection of aft 33% of Right Panel  | 5° Down              |
| <u>VERTICAL STABILIZER</u>            |                      |
| Airfoil                               |                      |
| Root, W.L. 114.5                      | NACA 0018(MOD)       |
| Tip, W.L. 37.6                        | NACA 0018(MOD)       |
| Area between W.L. 37.6 and W.L. 114.5 | 24.6 ft <sup>2</sup> |
| Span                                  | 6.41 ft              |
| Aspect Ratio                          | 1.67                 |
| Mean Aerodynamic Chord                | 3.92 ft              |
| Fuselage Station at 25% M.A.C.:       |                      |
| Fuselage Station                      | 620.3                |
| Waterline                             | 79.4                 |
| Taper                                 | 0.587                |
| Incidence                             | 0°                   |



MAIN ROTOR STA. 70



MAIN ROTOR STA. 302.4



TAIL ROTOR

Figure 22. AH-56A Rotor Blade Airfoil Sections.

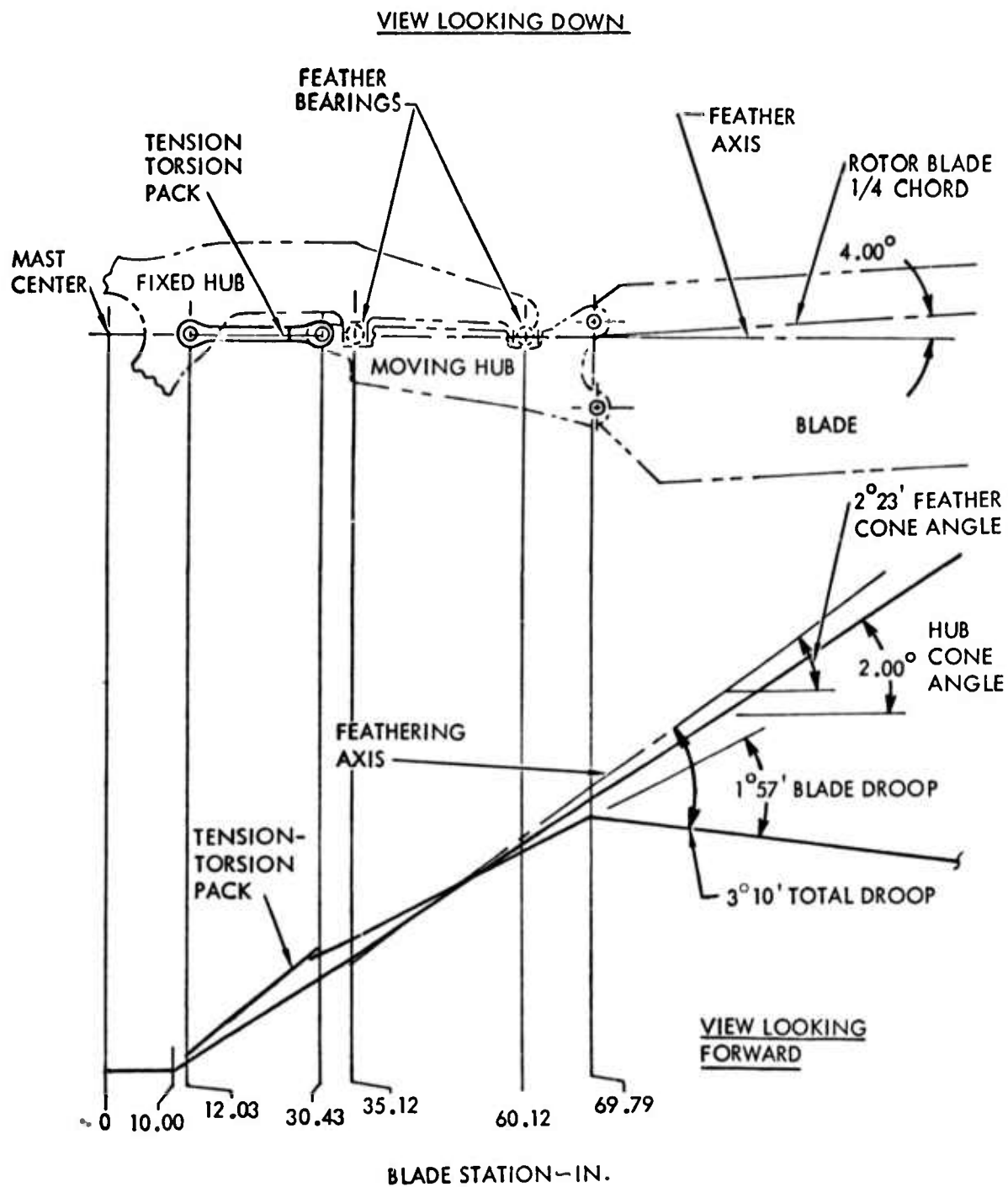


Figure 23. Detailed Blade/Hub Description.



in the design. Flight stabilization is achieved with a unique gyro control system. The ICS (Improved Control System) on the test vehicle was a version featuring an external gyro and feedback of the feathering moments for shaft moment control. The gyro is located above and concentric with the main rotor. It is attached to each blade by means of the pitch link and pitch horn. Gyro tilt is therefore equivalent to cyclic feathering. The pilot controls the vehicle by moving the cyclic stick. This control motion deflects a positive spring system and applies a moment to the gyro. The gyro precesses until a new tilt angle is achieved. This gyro tilt angle (i.e., blade cyclic angle) is that spatial position where the moments due to the feathering loads are in balance with the pilot's control gyro moment. The stability augmentation function is accomplished by the spatial reference characteristics of the control gyro.

In the simplest terms, the blade flapping associated with an external disturbance (i.e., gust) acting through a moment arm determined by the blade sweep results in a feathering feedback moment being applied to the gyro. This feedback moment precesses the gyro to a position which, by design, commands cyclic blade angle of a magnitude and phasing sufficient to correct for the external disturbance.

Pilot control of pitch and roll control moments to the gyro is accomplished with a conventional cyclic stick. Directional control is accomplished with "rudder" pedals which control tail rotor collective pitch. A conventional collective stick controls main rotor collective blade angle. A propeller collective blade angle control (Beta) is provided through a twist grip located at the top of the collective stick.

The normal mode of operation at low airspeed utilizes standard helicopter techniques of main rotor collective blade angle thrust and vehicle attitude variations for acceleration and flight path control. The compound technique used at higher airspeeds (i.e., above 100 KEAS) essentially fixes the main rotor collective at a predetermined position, and the vehicle is flown in a manner similar to a fixed-wing aircraft with the propeller used for acceleration and deceleration control.

Details of the rotating system are listed in Table IV.

The aircraft design gross weight is 18,300 pounds, the maximum overload gross weight is 22,550 pounds, and the weight empty is 12,847 pounds. Inertia data are listed in Table V.

#### XH-51A COMPOUND HELICOPTER

The XH-51A is a five-place light helicopter with a single gyro-controlled hingeless rotor. The basic configuration was modified by the addition of a tapered wing and the installation of a Pratt and Whitney J60-P-3 turbojet engine. The J60-P-3 was mounted in a nacelle on the left wing panel next to the fuselage. A photograph of the XH-51A compound helicopter is presented in Figure 24, and a three-view drawing is shown in Figure 25.

TABLE IV. CHARACTERISTICS OF AH-56A ICS DYNAMIC COMPONENTS

MAIN ROTOR

## Hub Location:

Fuselage Station 300.0

Waterline 165.3

Hub Precone 2°

Shaft Incidence 0°

Number of Blades 4

## Airfoil Section:

Root NACA(4.6)  
3012(MOD)Tip NACA(0.6)  
3006(MOD)

Radius 25.617 ft

## Blade Chord:

Rotor Station 79.12 27.50 in.

Rotor Station 140.0 27.60 in.

Rotor Station 170.0 Linear taper  
between stations 27.66 in.

Rotor Station 302.4 27.94 in.

Rotor Station 302.4 to tip 27.94 in.

## Droop:

Fixed Hub Feather Bearing Offset 23'

Moving Hub Feather Bearing Offset 50'

At Station 70 1° 57'

Total 3° 10'

Sweep Forward at Station 70 4° 00'

Disc Area 2062 ft<sup>2</sup>

Solidity 0.1159

Blade Twist, Root to Station 302.4 -5°

Blade Station at Tab Centerline 264.0

Tab Size 28.1 in. x 2 in.

TABLE IV. (Continued)

|  |  |
|--|--|
| Direction of Rotation, viewed from above     | Counterclockwise                               |
| Normal Tip Speed                             | 660 ft/sec                                     |
| <u>TAIL ROTOR</u>                            |  |
| Hub Location:                                |  |
| Fuselage Station                             | 658.5  |
| Waterline                                    | 114.5  |
| Buttline                                     | 72.0 Left                                      |
| Precone                                      | 0°   |
| Number of Blades                             | 4  |
| Airfoil Section                              | NACA(0.675)<br>300(5.89)(MOD)                  |
| Radius                                       | 5 ft   |
| Chord  | 1.167 ft                                       |
| Disc Area                                    | 78.5 ft <sup>2</sup>                           |
| Solidity                                     | 0.297  |
| Twist  | 0°   |
| Delta -3 Hinge                               | 37.5°  |
| Normal Tip Speed                             | 648 ft/sec                                     |
| Direction of Rotation, viewed from left side | Clockwise                                      |
| <u>PROPELLER</u>                             |  |
| Propeller Designation                        | Hamilton Standard<br>1311 GB 30/11FA<br>10A4-0 |
| Hub Location:                                |  |
| Fuselage Station                             | 675.7  |
| Waterline                                    | 114.5  |
| Shaft Incidence                              | 0°   |
| Number of Blades                             | 3  |
| Radius                                       | 5 ft   |
| Activity Factor Per Blade                    | 142  |
| Integrated Design Lift Coefficient           | 0.411  |
| Direction of Rotation, viewed from rear      | Counterclockwise                               |
| Normal Tip Speed                             | 899 ft/sec                                     |

| TABLE V. AH-56A INERTIA DATA                                   |                             |                             |
|--|-----------------------------|-----------------------------|
|  | Design Weight               | Maximum Weight              |
| Weight (entire aircraft)                                       | 18,300 lb                   | 22,550 lb                   |
| Center of Gravity<br>(entire aircraft, gear up)                |                             |                             |
| Fuselage Station   | 301.0                       | 300.4                       |
| Waterline  | 108.0                       | -                           |
| Products and Moments of<br>Inertia: (excluding<br>main rotor): |                             |                             |
| Roll $I_{xx}$  | 7,120 slug-ft <sup>2</sup>  | 18,100 slug-ft <sup>2</sup> |
| Pitch $I_{yy}$   | 55,300 slug-ft <sup>2</sup> | 58,000 slug-ft <sup>2</sup> |
| Yaw $I_{zz}$   | 51,600 slug-ft <sup>2</sup> | 62,800 slug-ft <sup>2</sup> |
| Products $I_{xy}$  | 1,611 slug-ft <sup>2</sup>  | 1,092 slug-ft <sup>2</sup>  |
| Products $I_{xz}$  | 1,127 slug-ft <sup>2</sup>  | 1,640 slug-ft <sup>2</sup>  |
| Products $I_{yz}$  | 35.3 slug-ft <sup>2</sup>   | 49 slug-ft <sup>2</sup>     |

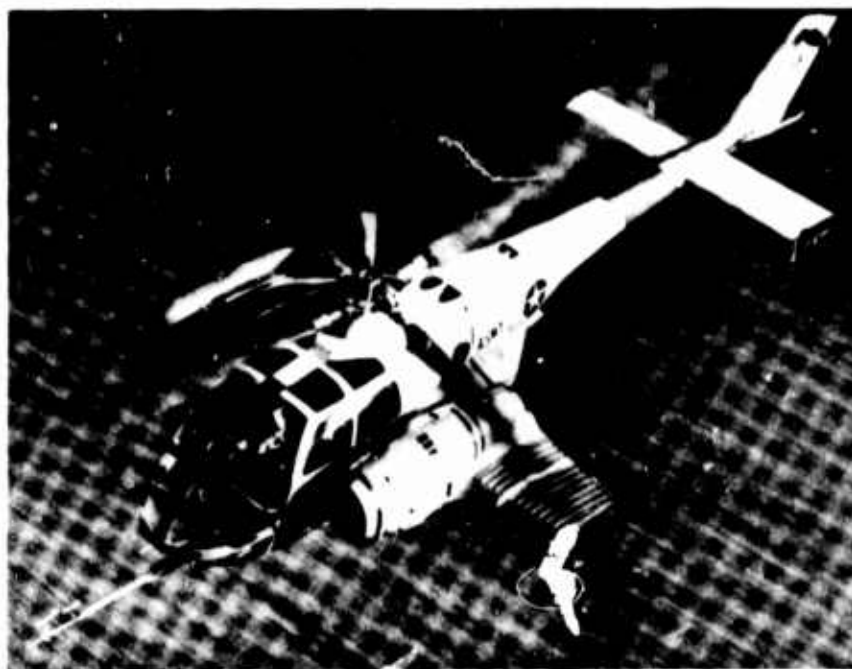


Figure 24. XH-51A Compound Helicopter (In Flight).

# MAIN ROTOR

DIAMETER \_\_\_\_\_ 51.234 FT  
CHORD AT TIP \_\_\_\_\_ 27.89 IN  
DISC AREA \_\_\_\_\_ 2062 SQ FT  
TIP SPEED \_\_\_\_\_ 660 FT/SEC

# TAIL ROTOR

DIAMETER \_\_\_\_\_ 10 FT 0 IN  
CHORD \_\_\_\_\_ 1 FT 2 IN (114.0 IN.)  
TIP SPEED \_\_\_\_\_ 618 FT/SEC

# PUSHER PROPELLER

DIAMETER \_\_\_\_\_ 10 FT 0 IN  
RPM \_\_\_\_\_ 1717  
TIP SPEED \_\_\_\_\_ 899 FT/SEC

# WING

AREA \_\_\_\_\_ 195.52 FT<sup>2</sup>  
ASPECT RATIO \_\_\_\_\_ 3.65

# HORIZONTAL TAIL

AREA \_\_\_\_\_ 318.50 FT<sup>2</sup>

# VERTICAL TAIL

AREA \_\_\_\_\_ 248.50 FT<sup>2</sup>

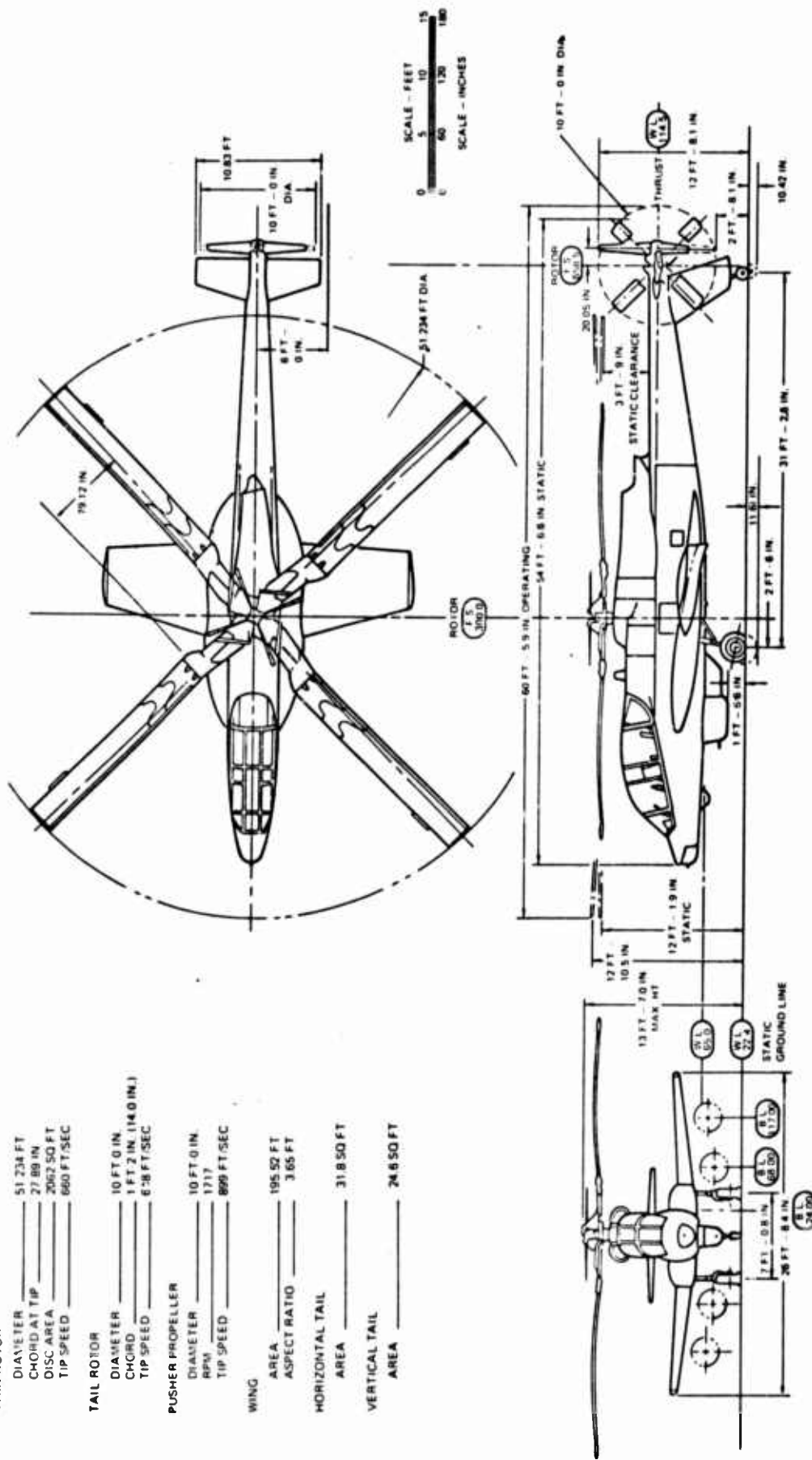


Figure 25. XH-51A Compound General Arrangement

# MAIN ROTOR

DIAMETER \_\_\_\_\_ 51.234 FT  
 CHORD AT TIP \_\_\_\_\_ 27.89 IN.  
 DISC AREA \_\_\_\_\_ 2062 SQ FT  
 TIP SPEED \_\_\_\_\_ 660 FT/SEC

# TAIL ROTOR

DIAMETER \_\_\_\_\_ 10 FT-0 IN.  
 CHORD \_\_\_\_\_ 1 FT-2 IN. (14.0 IN.)  
 TIP SPEED \_\_\_\_\_ 648 FT/SEC

# PUSHER PROPELLER

DIAMETER \_\_\_\_\_ 10 FT-0 IN.  
 RPM \_\_\_\_\_ 1717  
 TIP SPEED \_\_\_\_\_ 899 FT/SEC

# WING

SPAN \_\_\_\_\_ 195.52 FT  
 ASPECT RATIO \_\_\_\_\_ 3.65 FT

# HORIZONTAL TAIL

AREA \_\_\_\_\_ 31.8 SQ FT

# VERTICAL TAIL

AREA \_\_\_\_\_ 24.6 SQ FT

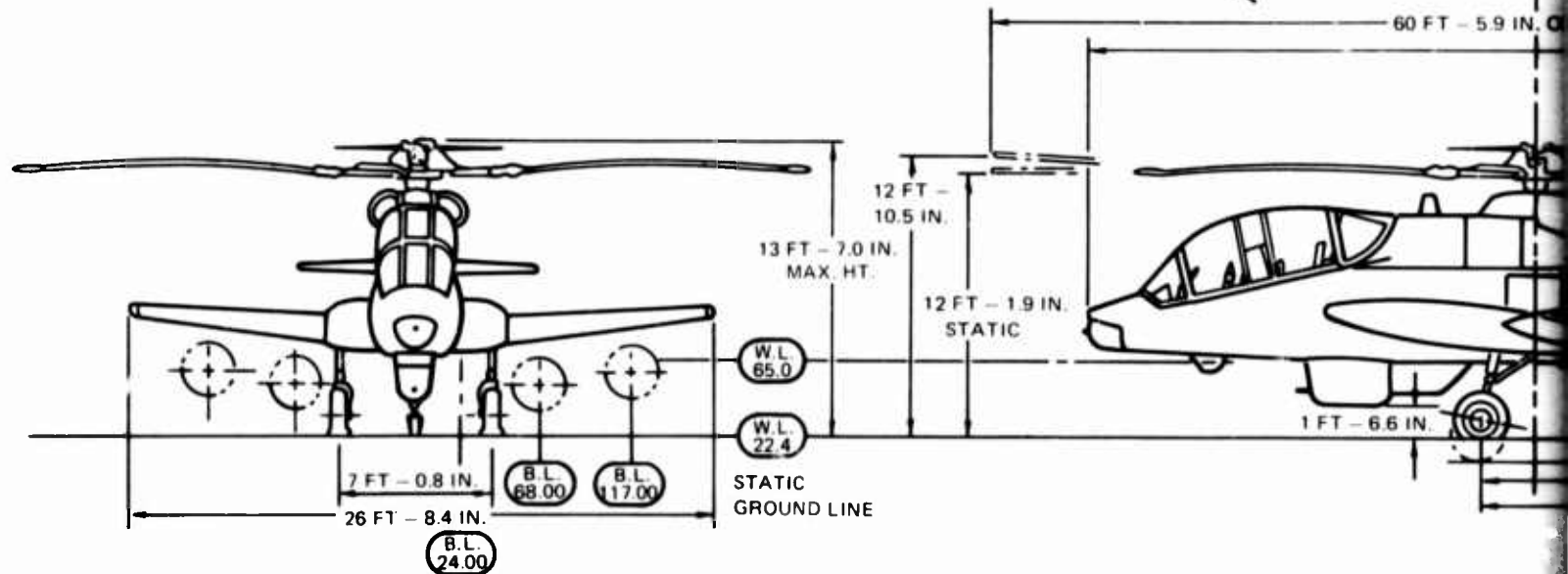
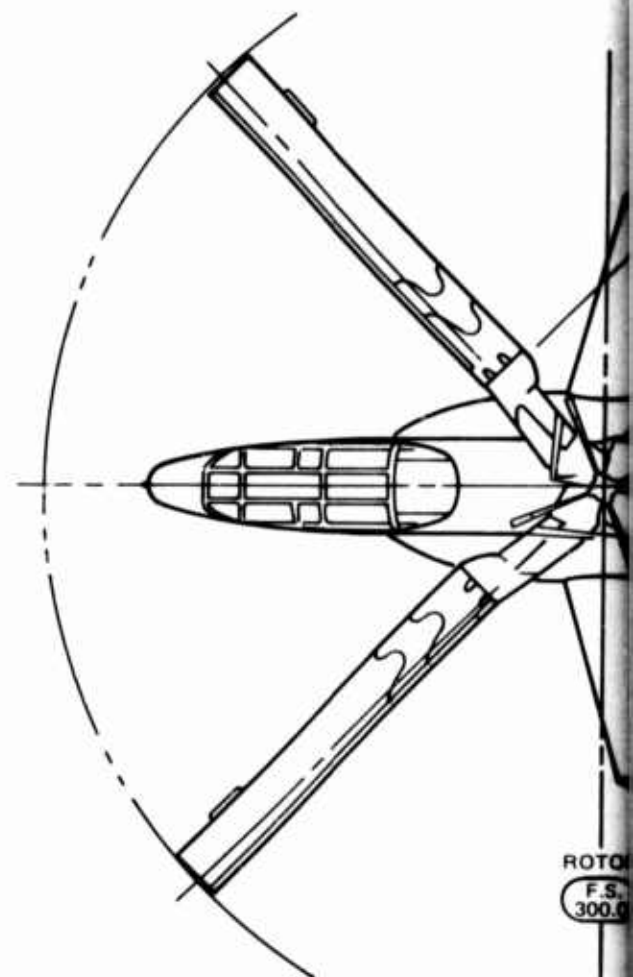
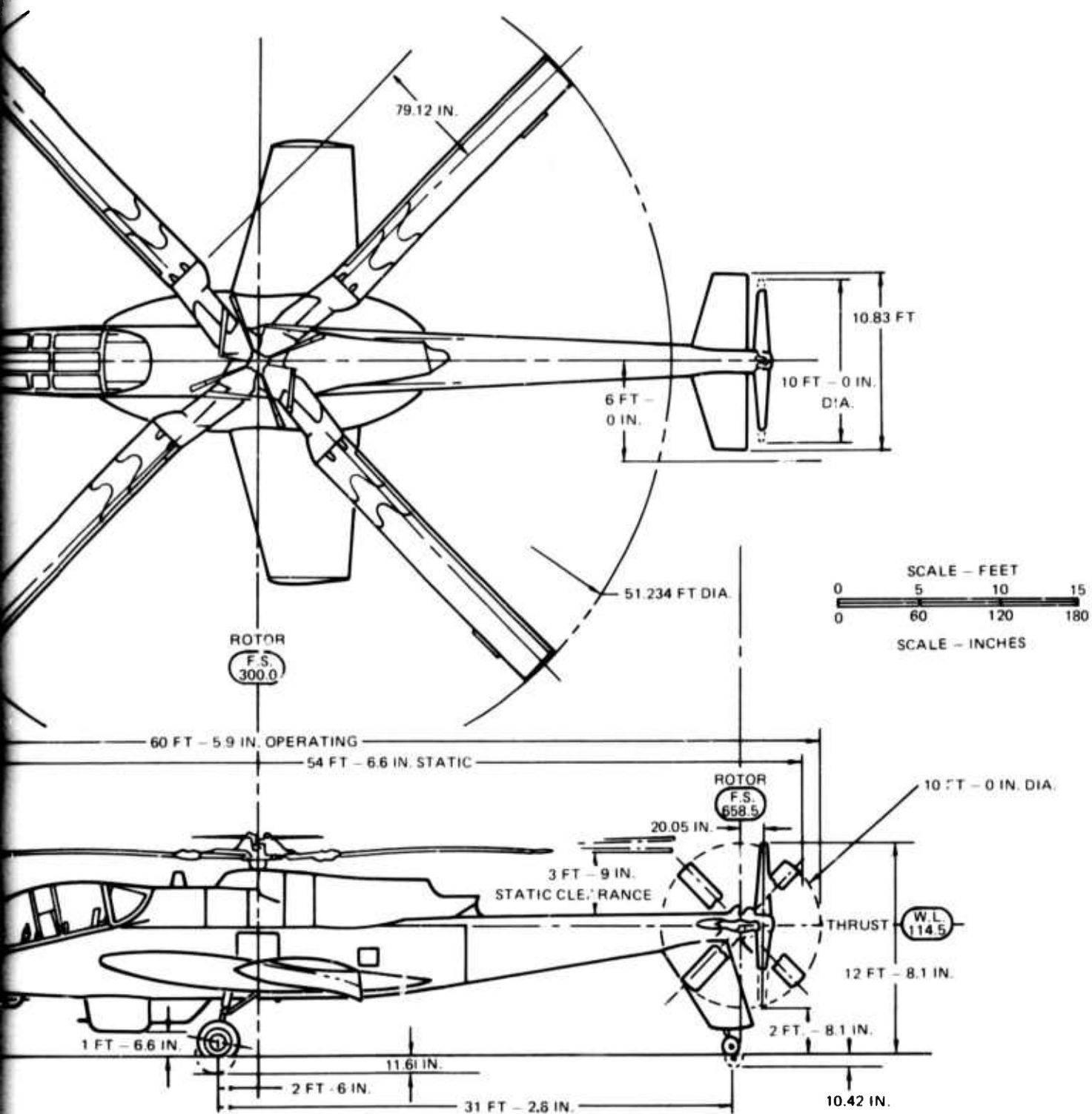


Figure 25. XH-51A Compound General Arrangement



The vertical stabilizer is swept back from the aft fuselage with a two-bladed tail rotor mounted at the tip. The horizontal stabilizer is rectangular in planform and mounted to the aft fuselage just forward of the tail rotor tip-path plane.

The main rotor design is similar to that previously described for the AH-56A except there are no external tension-torsion packs. The centrifugal force passes into the fixed hub through tension-torsion packs concentric and internal to the feather bearings. The blade attaches to the movable hub at blade station 27.8. The feather bearings are located at stations 15 and 23.

A Canadian Pratt and Whitney PT6B-9 turbine engine with a maximum takeoff horsepower of 550 powers the dynamic system. The landing gear consists of two retractable skids.

The controls, including the external gyro above the main rotor, are similar in design and principle of operation to those of the AH-56A with the ICS controls installed.

In the test configuration, the passenger space is used for instrumentation and extra fuel. The design gross weight of the test vehicle is 4,500 pounds.

Table VI summarizes the pertinent XH-51A configuration characteristics.

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TABLE VI. CHARACTERISTICS OF THE XH-51A  
COMPOUND HELICOPTER

WING

|  |            |
|--|------------|
| Span                                     | 16.83 ft   |
| Taper Ratio                              | 0.5        |
| Twist                                    | 0°         |
| Area                                     | 70 ft      |
| Dihedral                                 | 0°         |
| Aspect Ratio                             | 4.05       |
| Sweepback, 25% M.A.C.                    | 0          |
| Mean Aerodynamic Chord                   | 51.72 in.  |
| Airfoil Section                          | NACA 23012 |
| Incidence Relative to Fuselage Reference | -0.9°      |

HORIZONTAL STABILIZER

|  |                      |
|--|----------------------|
| Span                                     | 108 in.              |
| Chord (Constant)                         | 26.4 in.             |
| Twist                                    | 0°                   |
| Area                                     | 19.8 ft <sup>2</sup> |
| Dihedral                                 | 0°                   |
| Aspect Ratio                             | 4.1                  |
| Incidence Relative to Fuselage Reference | -0.25°               |
| Airfoil Section                          | NACA 0015            |
| Sweep                                    | 0°                   |

VERTICAL STABILIZER

|                       |                       |
|-----------------------|-----------------------|
| Span                  | 41.75 in.             |
| Tip Chord             | 38.5 in.              |
| Root Chord            | 51.5 in.              |
| Area                  | 12.68 ft <sup>2</sup> |
| Sweepback, 25% M.A.C. | 45°                   |
| Taper Ratio           | 0.70                  |
| Aspect Ratio          | 0.95                  |

TABLE VI. (Continued)

VERTICAL STABILIZER (Cont'd)

|                 |                |
|-----------------|----------------|
| Airfoil Section | NACA 4424(MOD) |
| Incidence       | 0°             |

MAIN ROTOR

|  |                     |
|--|---------------------|
| Type                                       | Rigid               |
| Diameter                                   | 35 ft               |
| Number of Blades                           | 4                   |
| Blade Chord                                | 13.5 in.            |
| Airfoil Section                            | NACA 0012(MOD)      |
| Blade Taper                                | 1                   |
| Blade Twist, Root to Tip                   | -5°                 |
| Rotor Tilt                                 | 6° forward          |
| Hub Precone                                | +3.2°               |
| Droop at Station 27.85 (No Bearing Offset) | 1°                  |
| Sweep Forward at Station 27.85             | 1.4°                |
| Disc Area                                  | 962 ft <sup>2</sup> |
| Solidity                                   | 0.0818              |
| Normal Operating Speed                     | 355 rpm             |

TAIL ROTOR

|                                    |               |
|------------------------------------|---------------|
| Diameter                           | 72 in.        |
| Number of Blades                   | 2             |
| Blade Chord                        | 8.5 in.       |
| Type                               | Teetering     |
| Airfoil Section                    | NACA 0012     |
| Blade Taper                        | 1             |
| Blade Twist, Root to Tip           | -4.35°        |
| Feathering Moment Balance Weights: |               |
| Weight                             | 2.25 lb/blade |
| Arm                                | 3.0 in.       |
| Delta -3 Hinge                     | 15°           |

TABLE VI. (Continued)

TAIL ROTOR (Cont'd)

|                        |                       |
|------------------------|-----------------------|
| Disc Area              | 28.27 ft <sup>2</sup> |
| Solidity               | 0.1503                |
| Pitch Change Travel    | 27° to -8°            |
| Normal Operating Speed | 2,085 rpm             |

TURBOJET

|  |                 |
|--|-----------------|
| Type                                       | Turbojet J60-P2 |
| Military Thrust at 200 Knots and Sea Level | 2,490 lb        |
| Engine Centerline Incidence                | +7°             |

INERTIA DATA

|  |                            |
|--|----------------------------|
| Design Gross Weight                            | 4,500 lb                   |
| Roll Mass Moment of Inertia (including rotor)  | 1,500 slug-ft <sup>2</sup> |
| Pitch Mass Moment of Inertia (including rotor) | 3,180 slug-ft <sup>2</sup> |
| Yaw Mass Moment of Inertia (including rotor)   | 3,800 slug-ft <sup>2</sup> |
| Rotor Polar Moment of Inertia                  | 1,013 slug-ft <sup>2</sup> |

## INSTRUMENTATION AND DATA REDUCTION

### AH-56A

The AH-56A data used in this report were recorded on a photo recorder and two 50-channel oscillographs. The photo recorder took time-lapse pictures of a photo panel of calibrated instruments similar to those installed in the pilot's panel. The oscillographs recorded the vehicle body rates and attitudes, gyro position, control positions, the blade-feathering angle, shaft moment, blade loads, and control loads. Correlation between the recording devices was effected by a timer that activated counters on the photo panel and simultaneously activated counters which were photographed on the oscillograms.

The following data were obtained from the photo panel:

- Airspeed (Boom)
- Pressure altitude (Boom)
- Outside air temperature
- Fuel used
- Rate of climb
- Time

All the above were corrected for instrument error. Airspeed and altitude were measured with a test airspeed boom system mounted on the nose of the vehicle. A position error calibration was applied to all airspeed and altitude data. Vanes measuring the angle of attack and the angle of sideslip were also mounted on the end of the nose boom. The ambient air temperature was obtained by correcting the indicated temperature for adiabatic temperature rise. The Mach number used in the computations was based on the speed of sound corresponding to ambient temperature. Vehicle weight and center of gravity were calculated from the fuel used.

The parameters listed below were not necessarily available on every test nor are they necessarily included in this report. They are, however, representative of the sensors installed on the test vehicle and recorded at various times during the test program.

- Angle of attack
  - Angle of sideslip
  - Longitudinal stick position
  - Lateral stick position
  - Roll rate
  - Pitch rate
  - Load factor at center of gravity
  - Bank angle
  - Pitch angle
  - Collective servo control load
  - Roll servo control load
  - Pitch servo control load
  - Gyro roll input angle
  - Gyro pitch input angle
  - Pitch link tension
  - Main rotor blade angle
  - Shaft bending moment
  - Flap bending moment at station 18 fixed hub
  - Flap bending moment at station 31 fixed hub
  - Flap bending moment at station 40.5 movable hub
  - Flap bending moment at station 52.5 movable hub
  - Flap bending moment at station 130.5 blade
  - Flap bending moment at station 174 blade
  - Flap bending moment at station 205 blade
  - Flap bending moment at station 235 blade
- } Blade No. 1

- Flap bending moment at station 270 blade
- Chord bending moment at station 18 fixed hub
- Chord bending moment at station 46 movable hub
- Chord bending moment at station 103 blade
- Chord bending moment at station 174 blade
- Chord bending moment at station 235 blade
- Torsion at station 131.5 blade
- Blade azimuth reference

Blade No. 1

The rotating bending moments and loads were sensed with strain-gage bridges. These bridges were compensated during calibration to eliminate unwanted axis "crosstalk." The signals were transmitted from the rotor through a slip ring assembly to appropriate signal-conditioning equipment and then to the oscillograph. No signal amplification was used with any of the sensors. This eliminated the "drift" concern which is often a problem in amplified signals. All measurements were deadweight calibrated in a laboratory. A pilot-operated shunt/calibration resistor system was included in each circuit to provide both a means of in-flight calibration determination and a check on proper sensor operation. The reference galvo deflection for the flap bending moments and the pitch link tension were corrected to compensate for the static weight of the blade.

The main rotor blade angle was measured between the fixed and movable hubs. The collective value of this measurement was adjusted for geometric blade twist so that the reduced data is applicable to the projected blade root on the hub centerline. The feathering moment was obtained by multiplying the pitch link load by an equivalent moment arm determined from the geometry of the pitch link and the pitch horn.

The angle of attack was corrected for fuselage upwash using data obtained during full-scale wind tunnel tests of the vehicle without the main rotor. A correction was also applied for the main rotor upwash which was estimated to have a value of 20 percent of a uniform rotor downwash distribution at the location of the angle of attack vane, Reference 6. An additional correction was applied to account for the effect of pitch rate on measured angle of attack due to offset of the vane from the aircraft center of gravity.

The rotor lift was determined from the collective flap bending at blade station 18. A calibration of this relationship was obtained during whirl tower tests. An analysis conducted using the Rotor Blade Loads program

indicates the change in this calibration with airspeed was negligible. In accelerated maneuvers, a correction was applied to the calibration for an additional blade weight inertial effect not included in the whirl tower calibration which was obtained at a load factor of one.

#### XH-51A

The instrumentation and data reduction for the XH-51A compound helicopter were similar to that previously described for the AH-56A. Only differences between the two vehicles will be discussed. The XH-51A photo recorder took time-lapse pictures of the pilot's panel instead of a separate photo panel.

The parameters obtained from the oscillograph were:

- Angle of attack
  - Longitudinal stick position
  - Lateral stick position
  - Roll rate
  - Pitch rate
  - Load factor at center of gravity
  - Bank angle
  - Pitch angle
  - Pitch link axial load
  - Main rotor blade angle
  - Rotor lift
  - Flap bending at station 6 fixed hub, blade number 2
  - Flap bending at station 115 blade
  - Flap bending at station 157 blade
  - Chord bending at station 6 fixed hub
  - Chord bending at station 45 blade
  - Blade azimuth reference
- blade no. 1

Rotor lift was determined from a "direct" measurement instead of from a collective flap bending-lift relationship. The XH-51A transmission was

mounted on springs compared to the AH-56A transmission which was hard mounted to the fuselage. Sufficient structural deflections occurred with the XH-51A transmission springs to result in sufficient strain gage output which was proportional to lift.

The XH-51A instrumentation did not include strain gages on the rotor shaft for shaft bending moments. Instead, the shaft moment magnitude was determined by multiplying the 1P flap bending moment at station 6 by a value determined from the Rotor Blade Loads program. The phase angles for the two parameters were assumed to be the same.

XH-51A blade load data are presented in Reference 10 at more test conditions and for more blade stations than are included in this report. The suitability of the reference data for comparison with REXOR is questionable because during the tests from which the referenced data was obtained, one blade was highly modified for installation of blade pressure transducers. The structural characteristics of this modified blade differed from the other three blades. The blade bending instrumentation was located on this modified blade. The REXOR program has four equal blades and uncertainty exists whether the XH-51A blades in question would be adequately represented in REXOR. Therefore, these previously published data are not suitable for this correlation effort.

#### DATA QUALITY

The following discussion describes items pertinent to making a judgment on the accuracy and consistency of the test data. This includes the machine routines used to process the data in a form suitable for analysis.

The overall static instrumentation system accuracy was between 1 percent and 5 percent of the full-scale value of the particular parameter. The dynamic (i.e., rotating) accuracy was primarily a function of the natural frequency of the galvanometer used for the particular measurement. In all cases, the galvanometers were selected to result in negligible load magnitude attenuation within the frequency range of interest. The frequency response of the galvanometer does have an impact on the phasing. The theoretical phasing lags resulting from the galvanometers used for the rotating measurements are tabulated in Table VII.

The system accuracy on establishing phase angle was primarily limited by readability. The phasing of the 1P could not be reliably reduced more accurately than  $\pm 5$  degrees and the 2P not more accurately than  $\pm 10$  degrees. Therefore, to be consistent with system accuracy capability, the only lag correction applied to the rotating data was for the 1P blade angle data. Although the theoretical lag was 36 degrees, a correction of only 30 degrees was applied. This number was based on experimental comparisons of the swashplate position as derived from the rotating blade angle measurement compared to that derived from the nonrotating measurements.



| TABLE VII. PHASING LAGS FOR ROTATING MEASUREMENTS |                                    |          |              |
|---|------------------------------------|----------|--------------|
| Measurement                                       | Galvanometer<br>Frequency Response | Harmonic | Lag<br>(deg) |
| Main Rotor Blade Angle                            | 10 Hz                              | 1P       | 36           |
| Strain Gage Measurements                          | 100 Hz                             | 1P       | 3.7          |
|   |                                    | 2P       | 7.4          |

The consistency of the test data is shown in Figures 26 through 28. On these curves, representative loads are broken down into the primary harmonics and the corresponding phasings are plotted versus airspeed. Note that the scatter from the faired curves of this data, which was taken at various stages of the program, is small. Some of this scatter can be attributed to the listed variations in weight, center of gravity, and collective blade angle.

The computer software used for the harmonic analysis routines was identical to that used to analyze the data of Reference 10. A two-rotor revolution time span was used for each data point to improve accuracy. The system was checked by inputting periodic waveforms of known characteristics and comparing the computer output with the known harmonics.

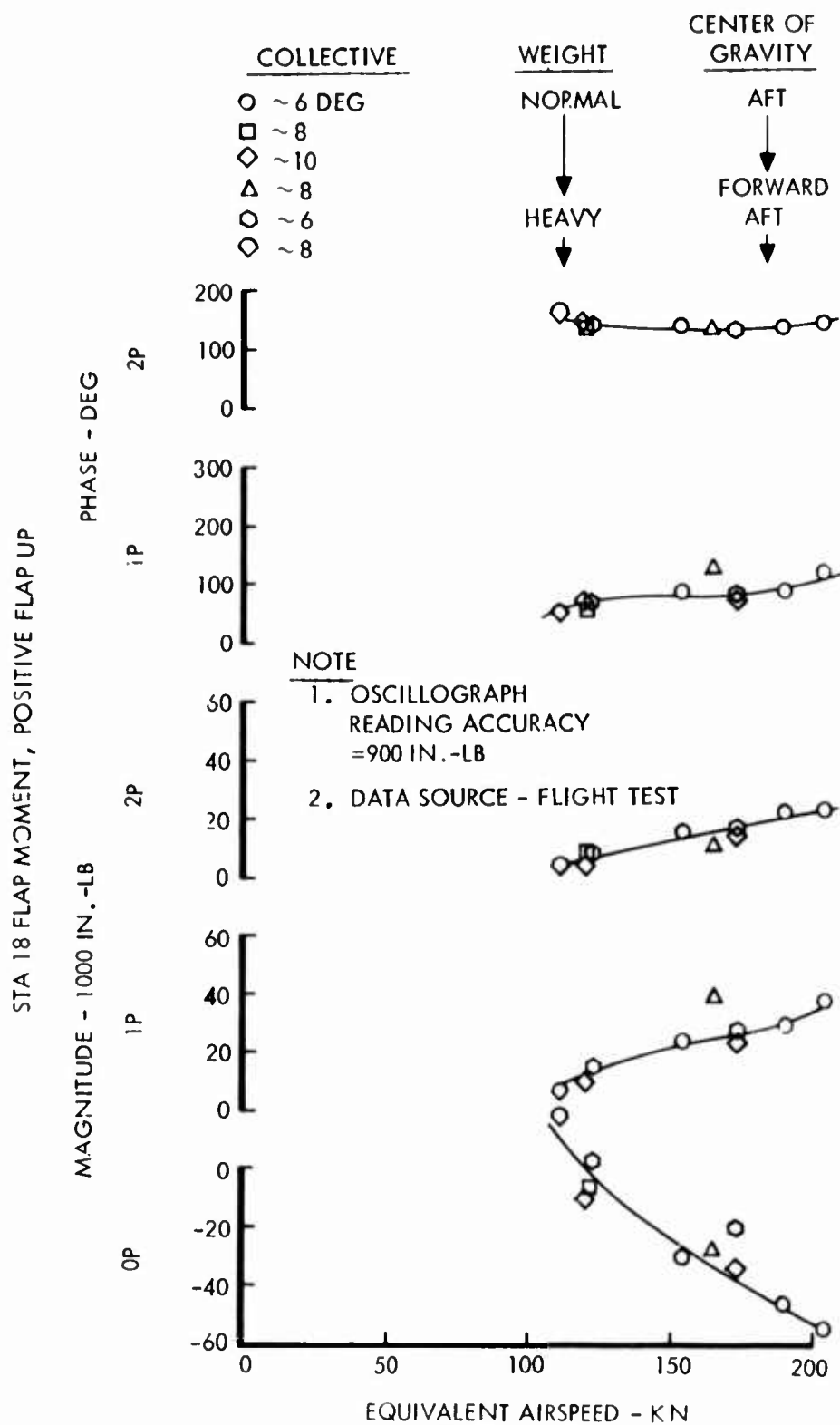


Figure 26. AH-56A Blade Sta 18 Flap Moment vs. Airspeed.

STA 18 CHORD MOMENT, POSITIVE LAG AFT

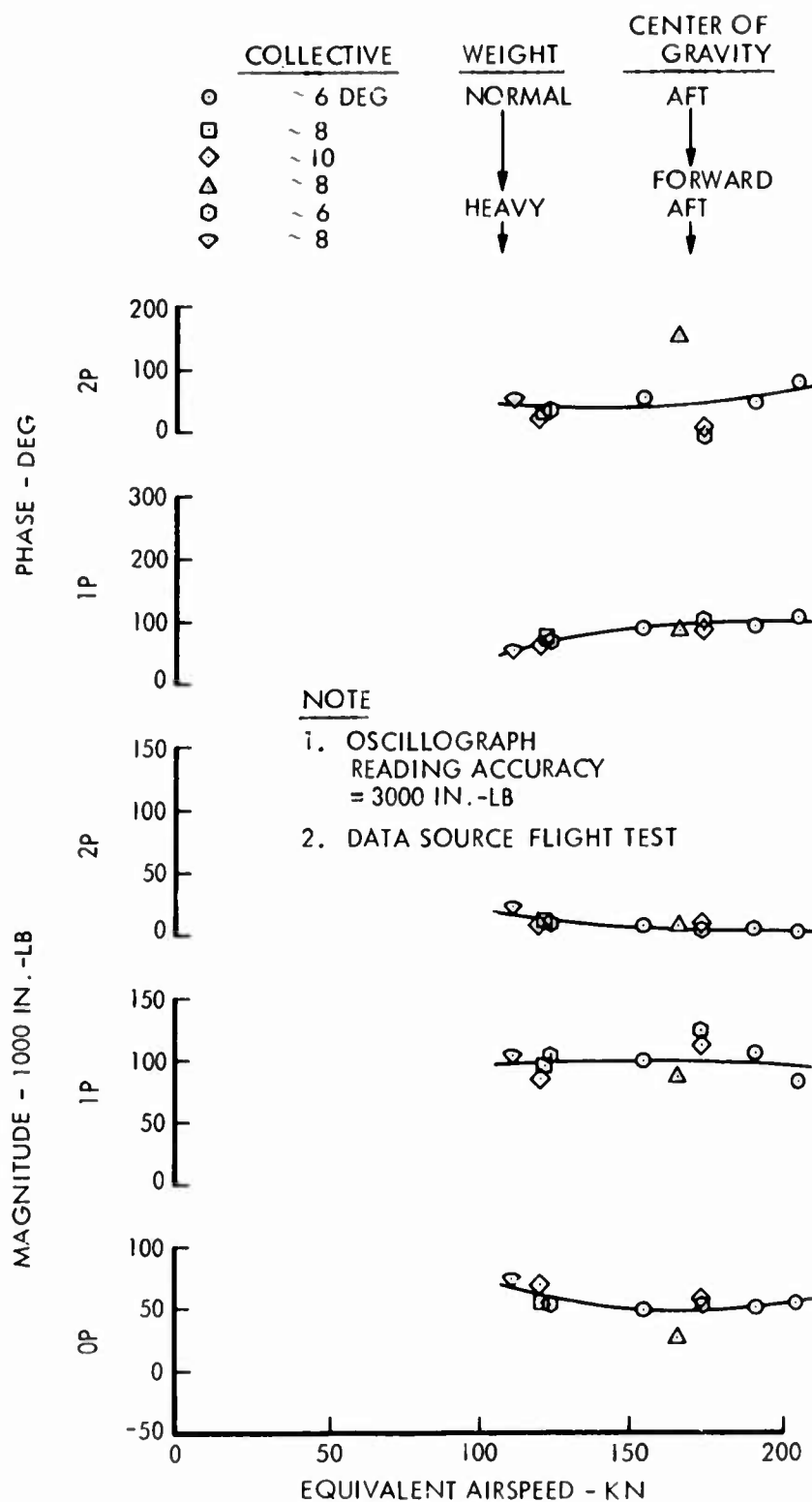


Figure 27. AH-56A Blade Sta 18 Chord Moment vs. Airspeed.

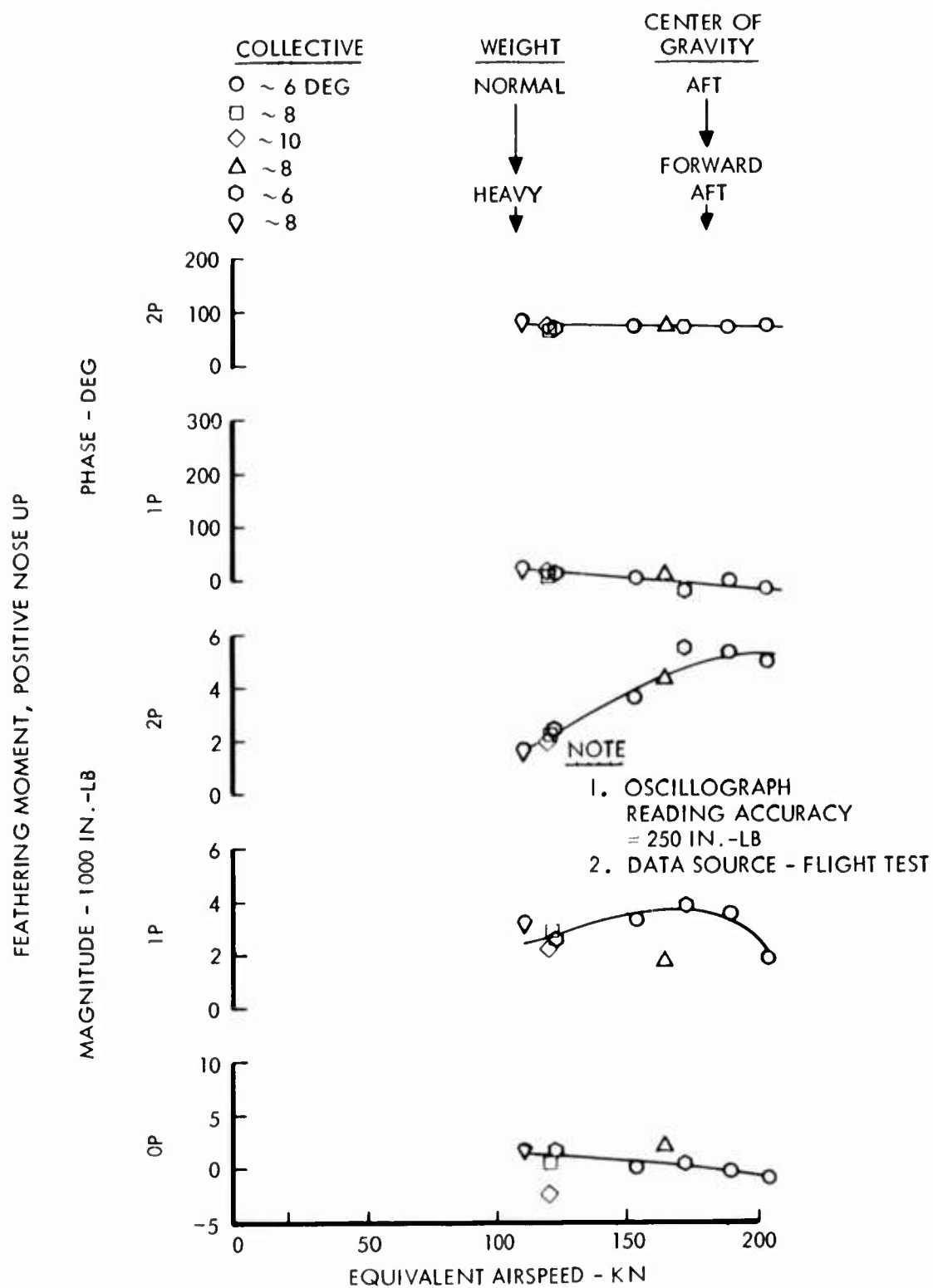


Figure 28. AH-56A Feathering Moment vs. Airspeed.

## DISCUSSION OF RESULTS

This section presents a discussion and review of typical steady-state correlation data plus a complete summary of the transient response correlation data. In addition, Appendix II presents all of the steady-state correlation data obtained during the study. Table I gives a listing of the various correlation cases contained in this study. The first 40 cases (33 on which correlation studies were made) are AH-56A steady-state trim conditions, Cases 41 to 44 are XH-51A steady-state trim conditions, and Cases 45 through 52 and 53 through 56 are transient maneuver conditions for the AH-56A and XH-51A vehicles, respectively. The table also includes a tabulation of the parameters which define each flight condition. Items tabulated include airspeed, atmospheric conditions, collective blade angle, gross weight, center of gravity, rotor lift, shaft moment, rate of climb, load factor, and rotor speed.

The correlation data is presented in terms of either comparisons of harmonics of blade loads for the steady-state conditions or time histories of blade loads for transient conditions. The harmonics of the blade loads,  $M$ , are defined by the following equation.

$$\begin{aligned} M(t) = & a_0 + c_1 \cos (\Omega t - \phi_1) \\ & + c_2 \cos (2 \Omega t - \phi_2) + \dots \\ & + c_n \cos (n \Omega t - \phi_n) \end{aligned}$$

where  $t$  is time;  $\Omega$  is rotor speed;  $a_0$  is mean or "OP" component; and  $c_1, c_2, \dots, c_n$ , and  $\phi_1, \phi_2, \dots, \phi_n$  are the amplitude and phase of the 1P, 2P,  $\dots$ , nP harmonic, respectively. Only the OP, 1P, and 2P components of response are included for comparison in the correlation study and are referred to accordingly.

The following points are introduced to clarify the data presented:

- Blade loads are referred to moving axes aligned with the blade chord. Fixed hub loads at blade station 0.0, the hub center, and at station 18 on the AH-56A and station 6 on the XH-51A are defined in orthogonal coordinates perpendicular and parallel to the shaft.
- Test data for the root 1P flapping moments are measured shaft moments divided by two.
- Test data for torsion were only available on the AH-56A, and then only at rotor station 131.5 on the blade.

- Torsion is referenced to the elastic axis while the flapping and chordwise moments are referenced to the neutral axis.
- REXOR was trimmed to the same rotor lift and shaft moments as occurred on the test case. Collective pitch was also fixed while the rotor angle of attack and the blade cyclic feathering angles were allowed to vary until rotor lift and shaft moments were achieved. Airspeed, load factor, and ambient air pressure and temperature were the same in the analysis as occurred at the flight test condition.

#### AH-56A STEADY-STATE CORRELATION RESULTS

As indicated above, test data was reduced for 40 cases with airspeeds ranging from 111 to 205 KEAS, load factors from slightly below 1.0 to 1.77 g, rotor lifts from 3400 to 22,600 pounds, and shaft moments up to 310,000 inch-pounds. Again, Table I presents the basic trim conditions for these cases. All but Cases 2, 3 and 25 fell into eight groups where load factor was the principal variable, with airspeed being held about constant in each group. REXOR correlation studies were performed by trimming to the flight conditions for a selection of 33 of the 40 cases. A few test cases were obtained in mild pushovers, where the load factor was slightly below 1 g, which could not be precisely duplicated since pushovers are not true steady-state maneuvers. Also, trim could not be established in the analysis in Cases 33, 34, and 35, where there was substantial penetration into blade stall. The inability to trim these conditions is attributed to the lack of a dynamic stall description in the analysis and the associated nonlinearities in trim derivatives in the stall region. As indicated in the model description, a dynamic stall description has been subsequently added to the model but was not used in the present study.

Since the primary purpose of this study was prediction of maneuver flight loads, only a summary of correlation data obtained for steady-state cases is presented in this section. The complete set of steady-state correlation data is given in Appendix II. The summary contained in this section reviews trends with forward speed and load factor. Figures 29 through 34 present root and midspan flap, chord and torsion moments versus airspeed for 1 g flight and at a nominal collective blade angle of six degrees. The root chord and flap moments are for span station 18 on the fixed hub, and the midspan moments are at rotor station 174. The root torsion moment is the feathering moment reacted by the pitch arm, while the midspan torsion moment is measured at rotor station 131.5.

Likewise, Figures 35 through 40 present these same loads as a function of load factor for typical conditions at 165 KEAS. Figure 41 gives the corresponding trim angles associated with these load factors. Figures 42 through 46 show correlation data as a function of span for a 1 g level flight case at 154 knots; Figure 42 gives steady or OP flapping and chordwise moments as a function of span; Figure 43, the 1P and 2P flapping

# STA 18 FLAP MOMENT, POSITIVE FLAP UP

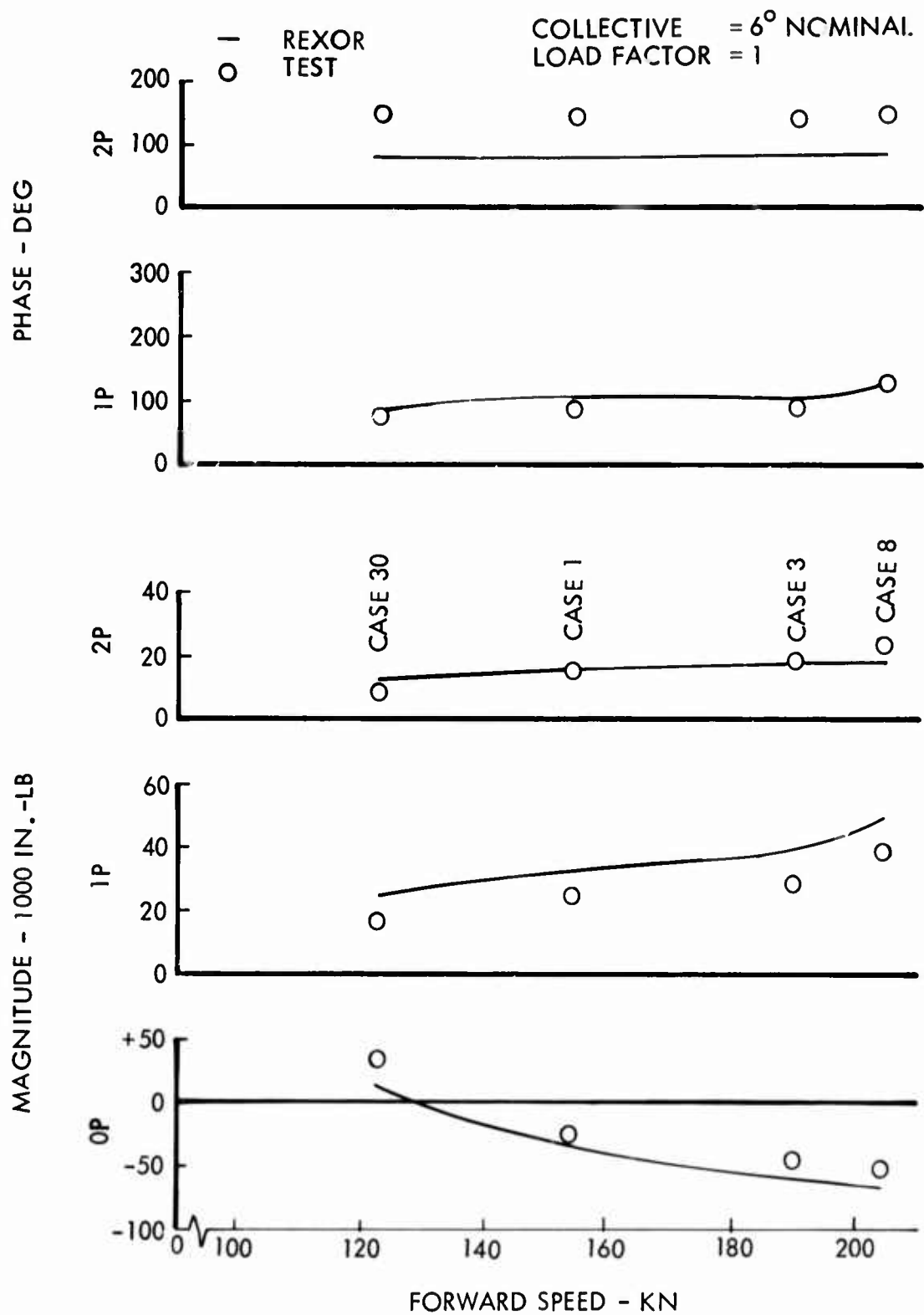


Figure 29. AH-56A Flap Moment vs. Forward Speed.

# STA 18 CHORD MOMENT, POSITIVE LAG AFT

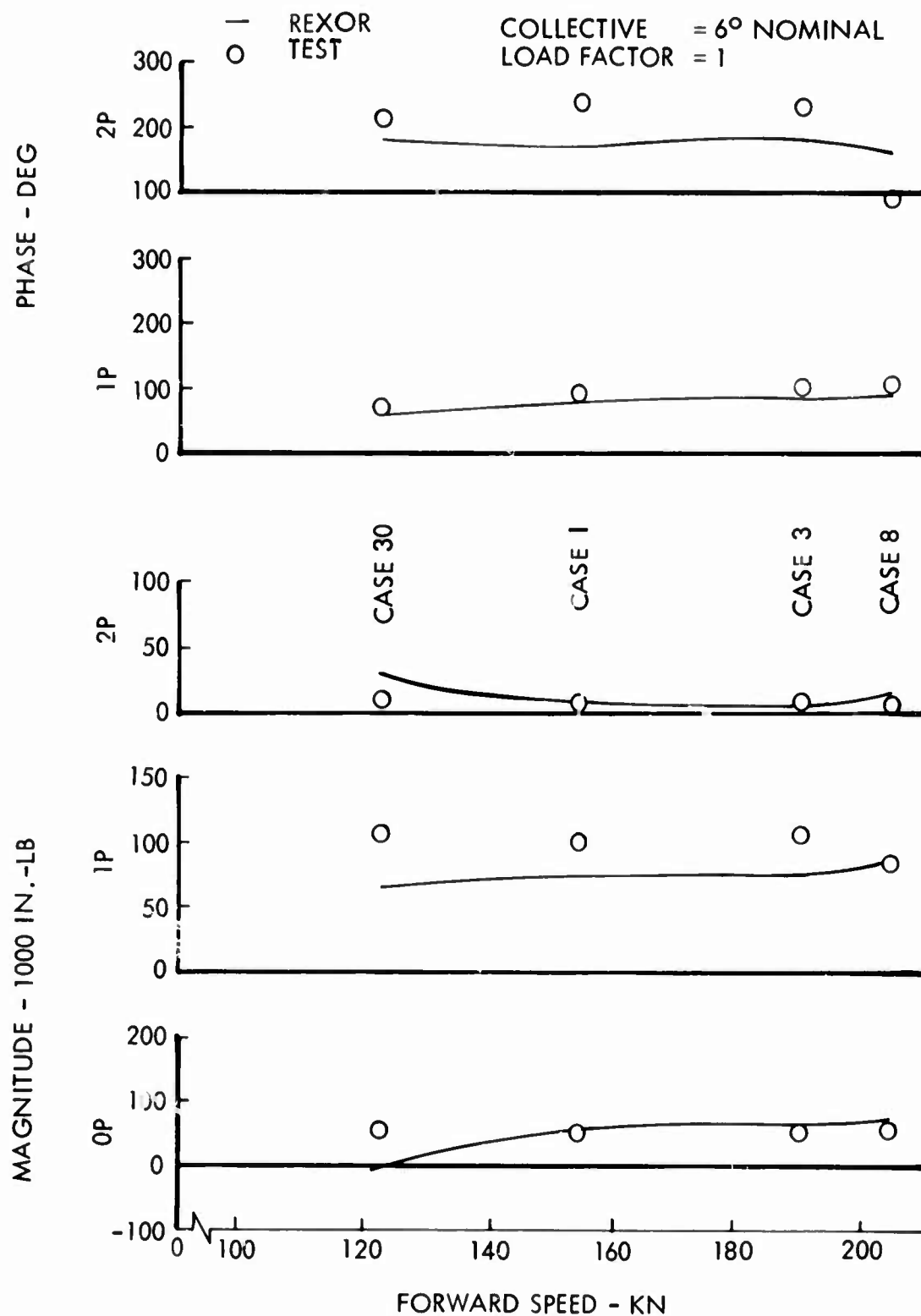


Figure 30. AH-56A Sta 18 Chord Moment vs. Forward Speed.



STA 174 FLAP MOMENT, POSITIVE FLAP UP

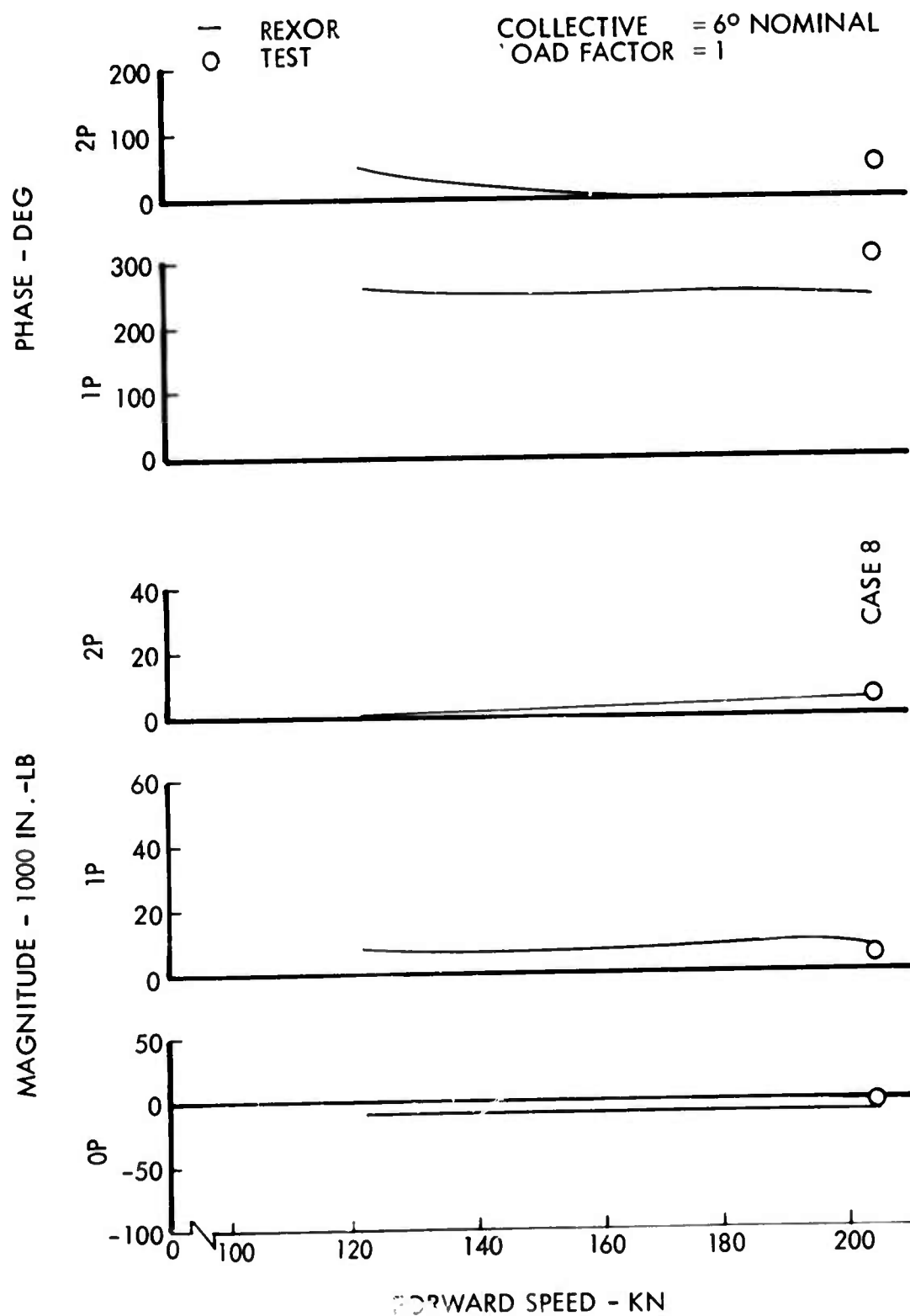


Figure 31. AH-56A Sta 174 Flap Moment vs. Forward Speed.

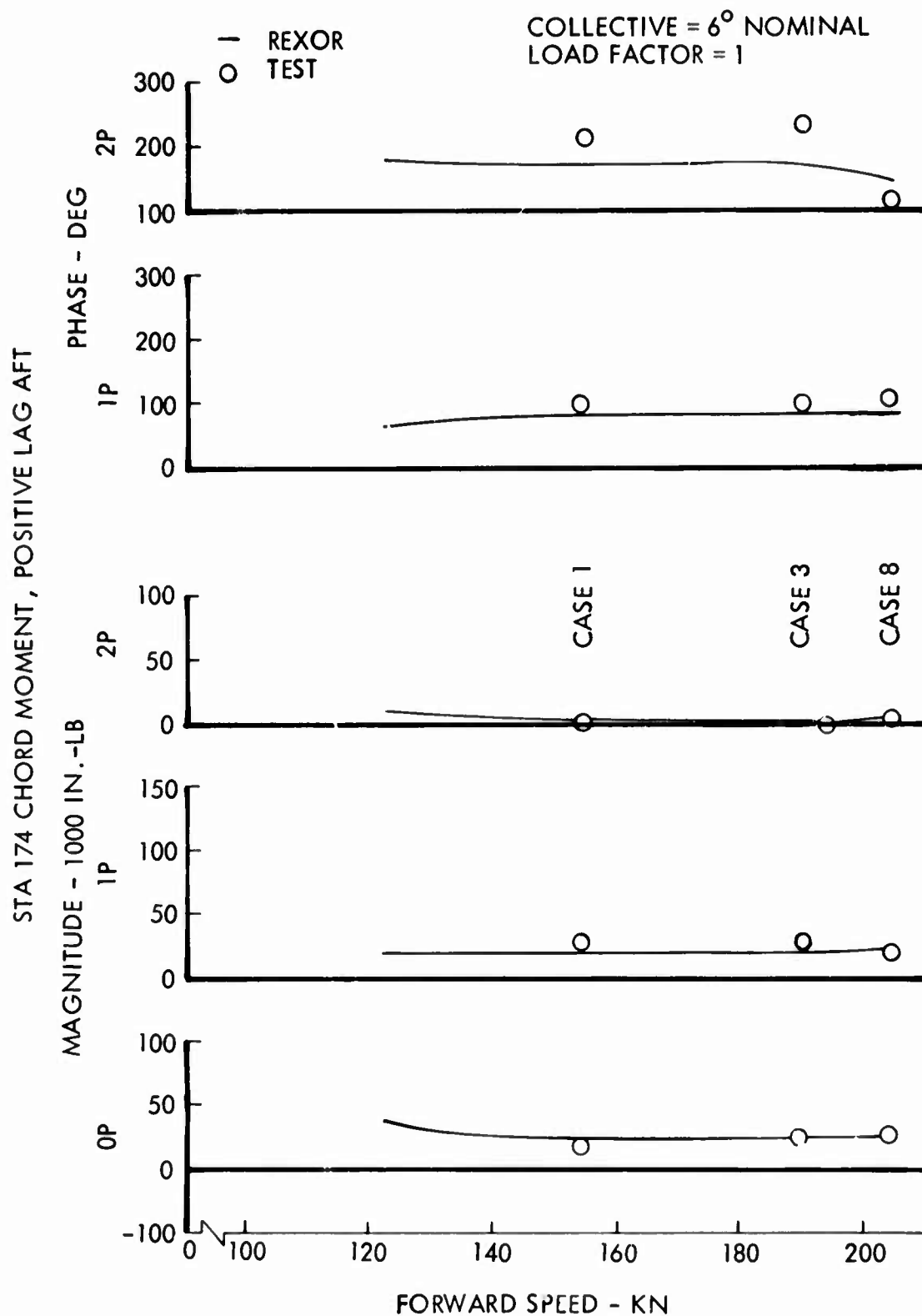


Figure 32. AH-56A Sta 174 Chord Moment vs. Forward Speed.

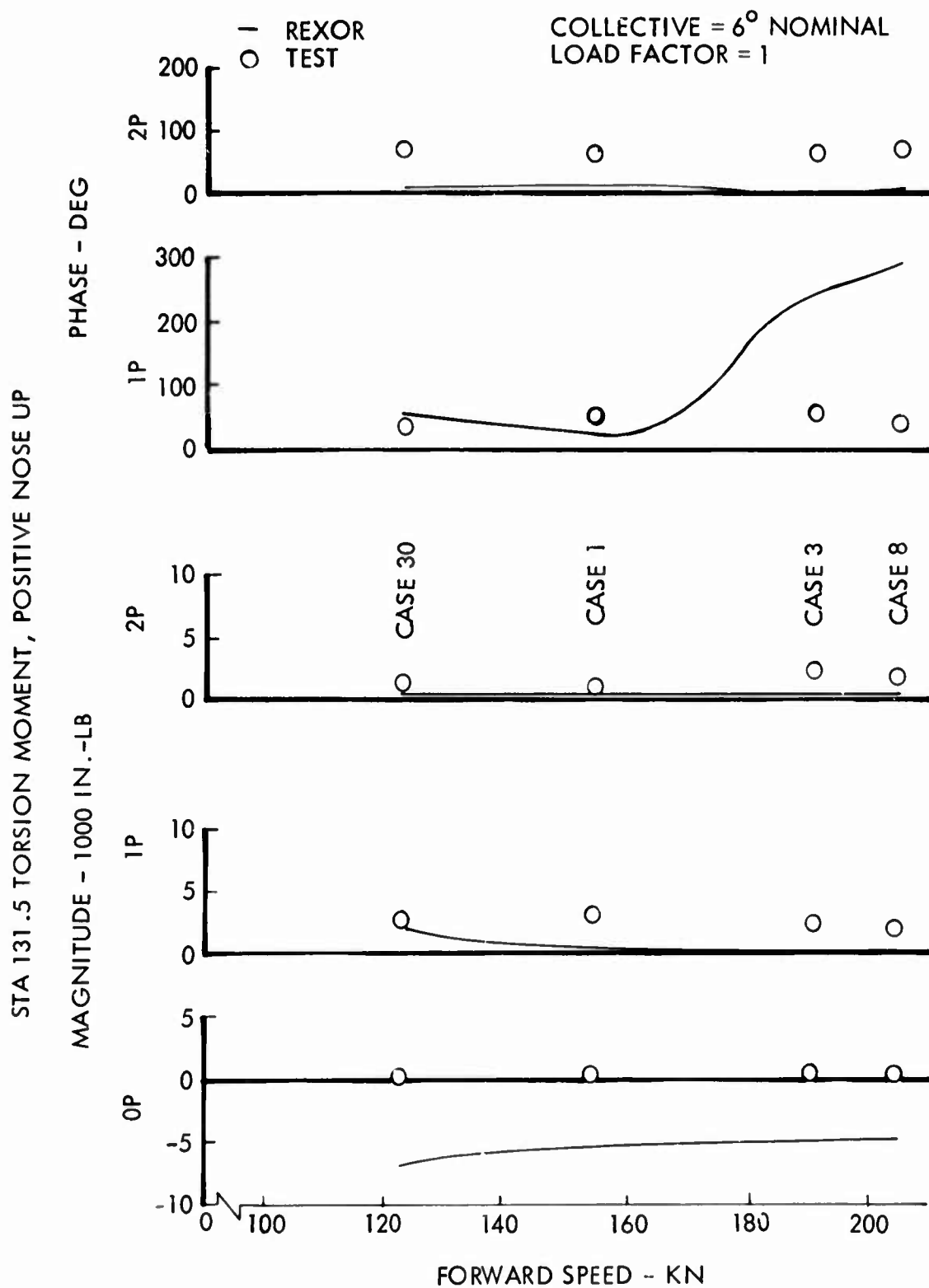


Figure 33. AH-56A Sta 131.5 Torsion Moment vs. Forward Speed.

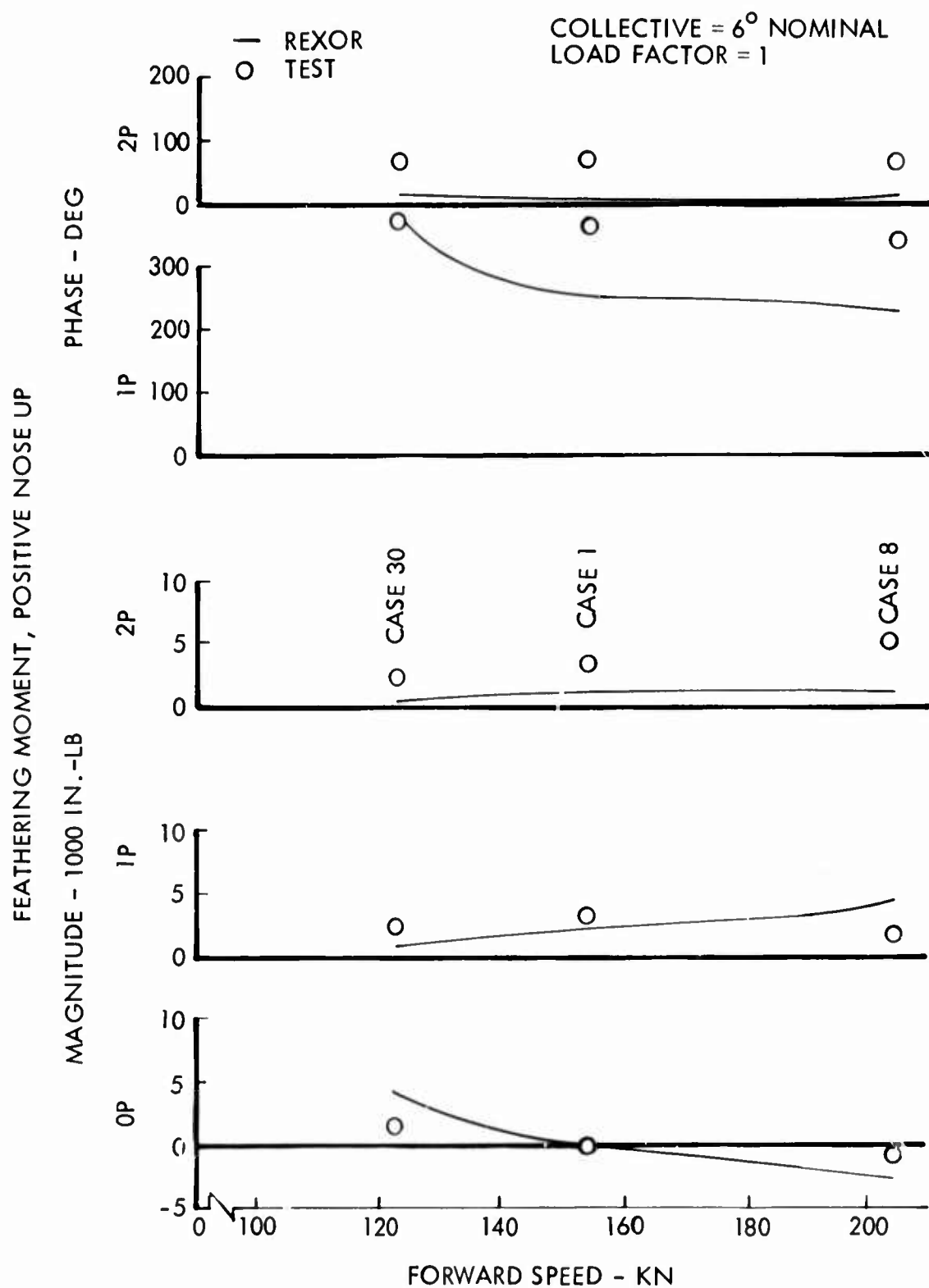


Figure 34. AH-56A Feathering Moment vs. Forward Speed.

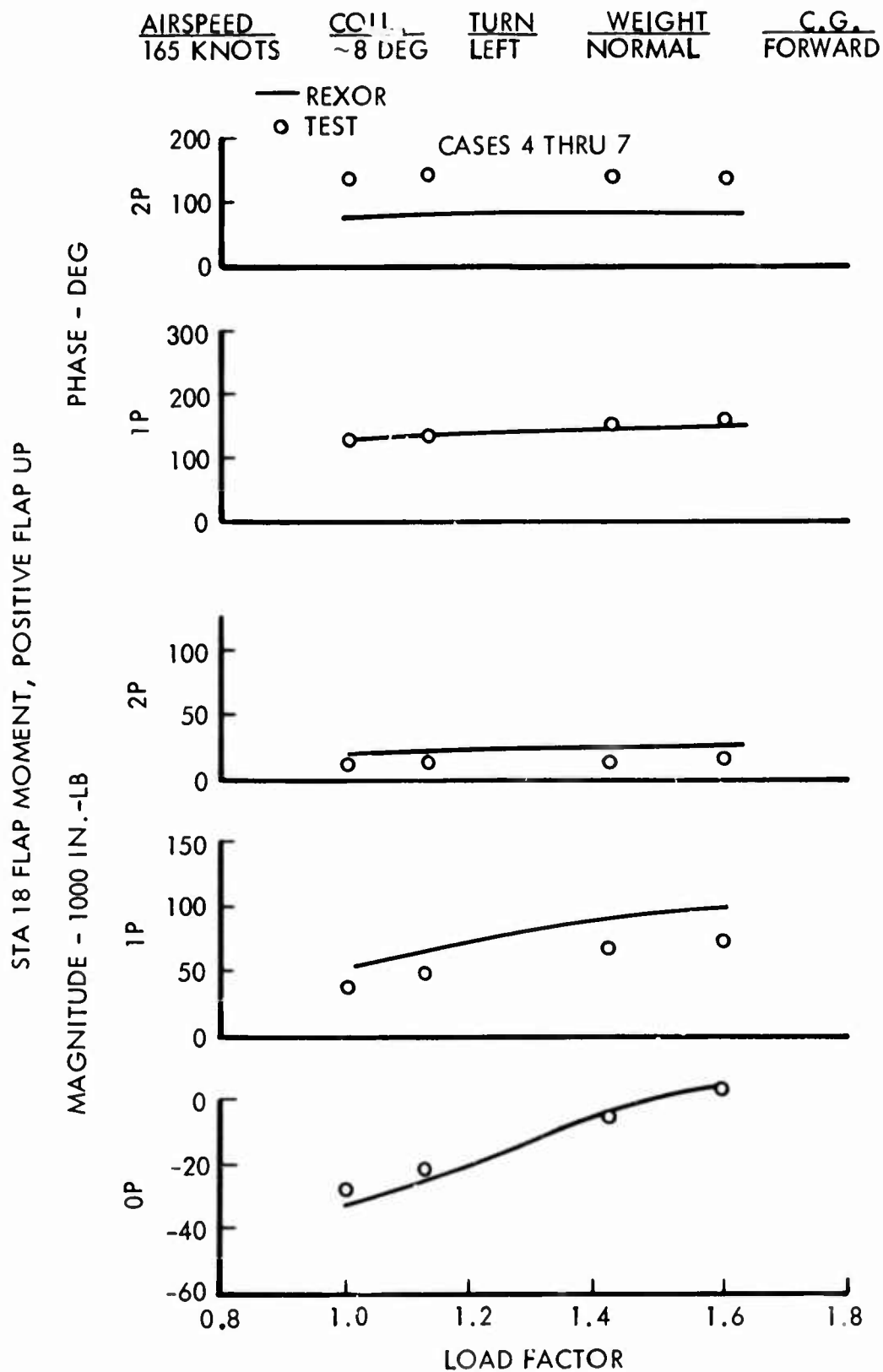


Figure 35. AH-56A Sta 18 Flap Moment vs. Load Factor.

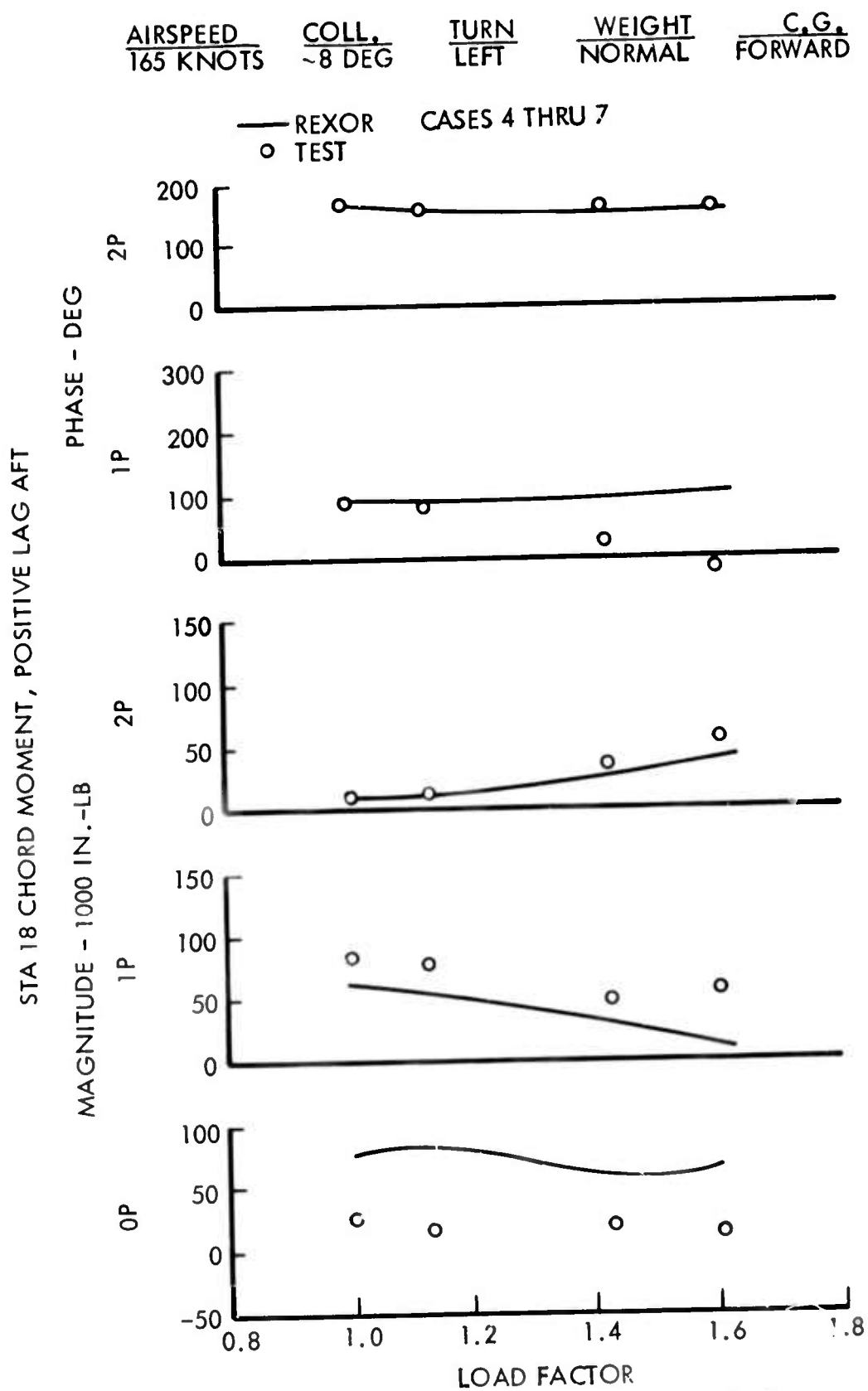


Figure 36. AH-56A Sta 18 Chord Moment vs. Load Factor.

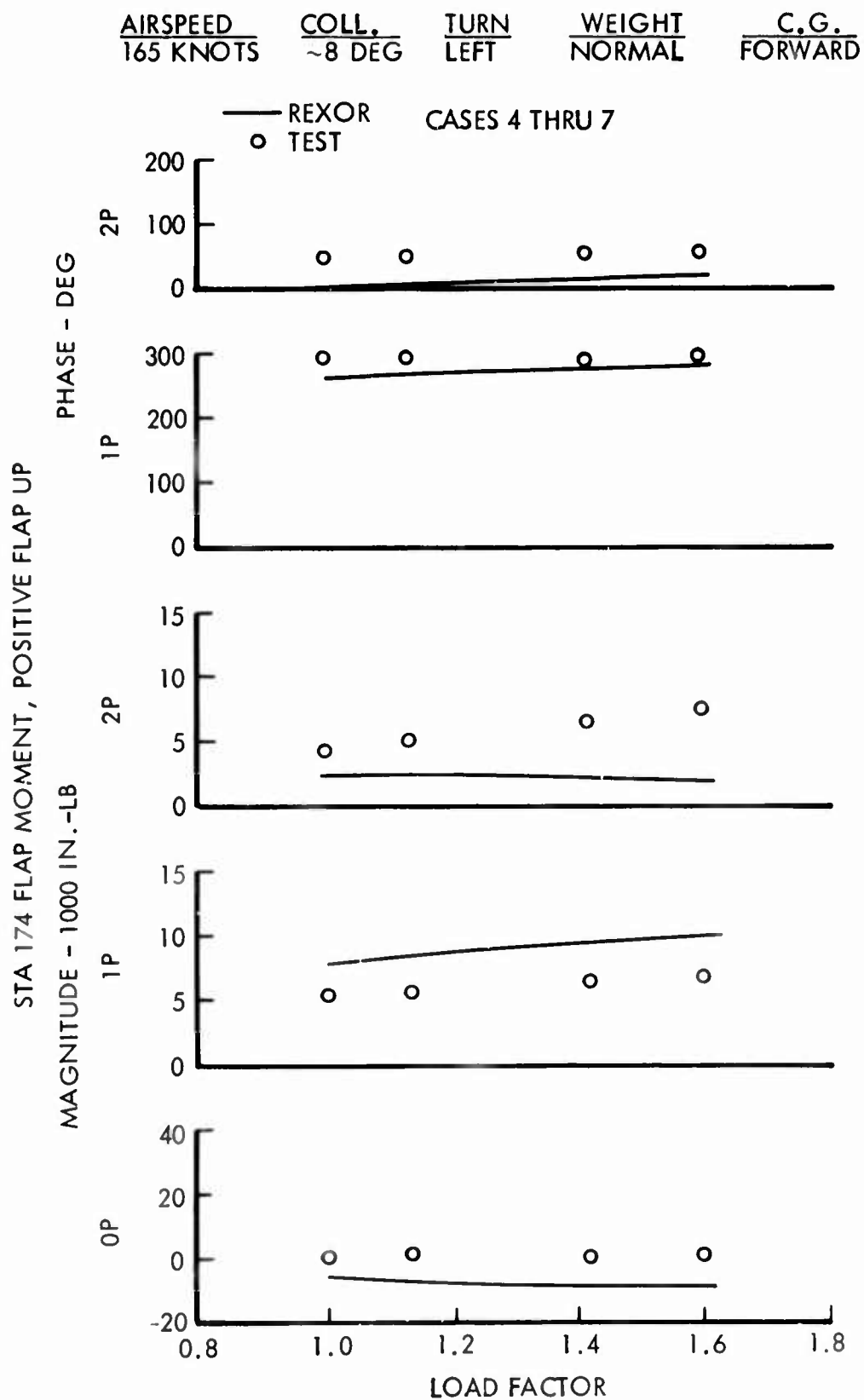


Figure 37. AH-56A Blade Sta 174 Flap Moment vs. Load Factor.

AIR SPEED   COLL.   TURN   WEIGHT   C.G.   — REXOR  
 165 KNOTS   ~8 DEG   LEFT   NORMAL   FORWARD   ○ TEST  
 CASES 4 THRU 7

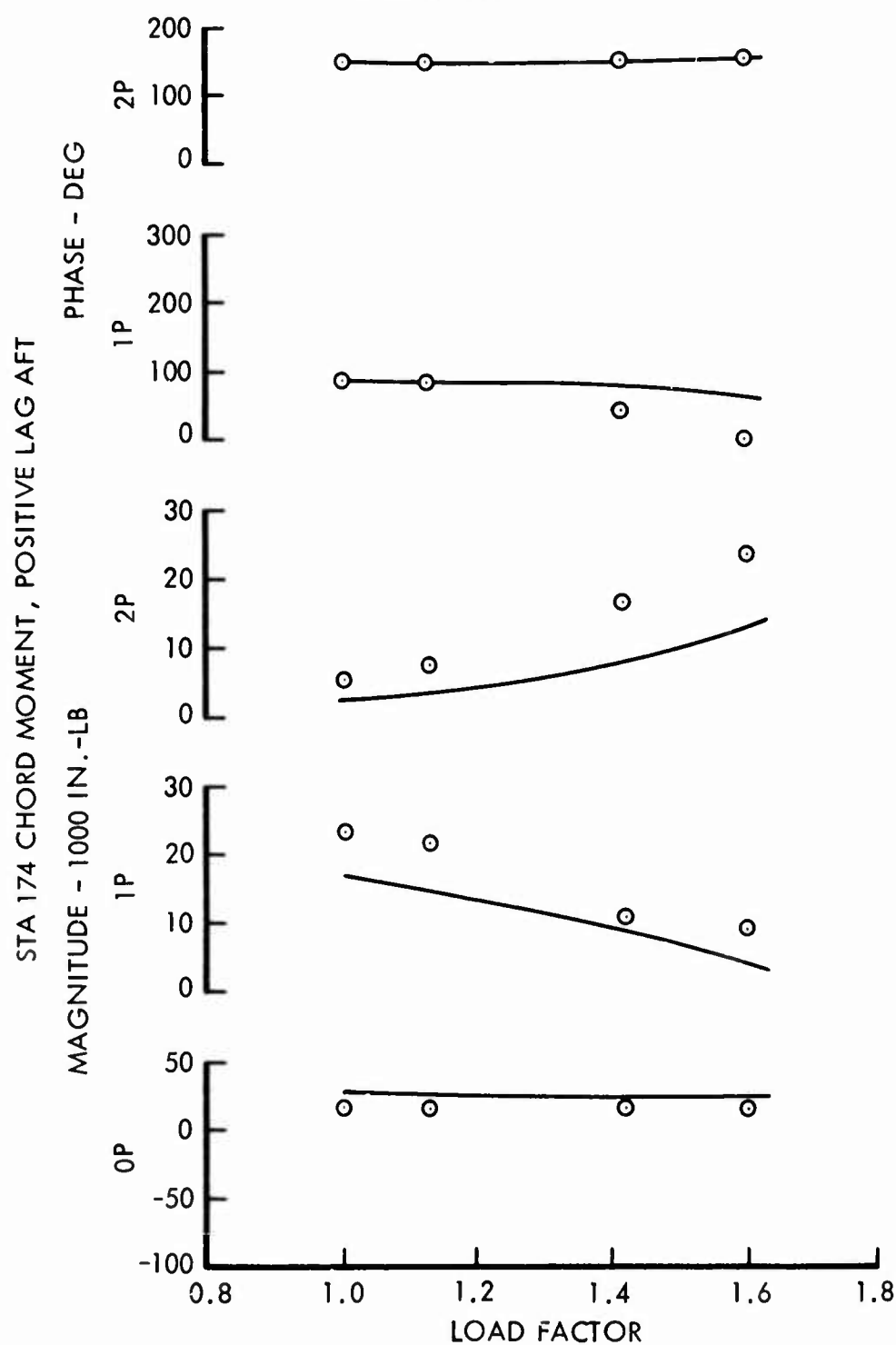


Figure 38. AH-56A Blade Sta 174 Chord Moment vs. Load Factor.



AIRSPEED  
165 KNOTS

COLL.  
8 DEG

TURN  
LEFT

WEIGHT  
NORMAL

C.G.  
FORWARD

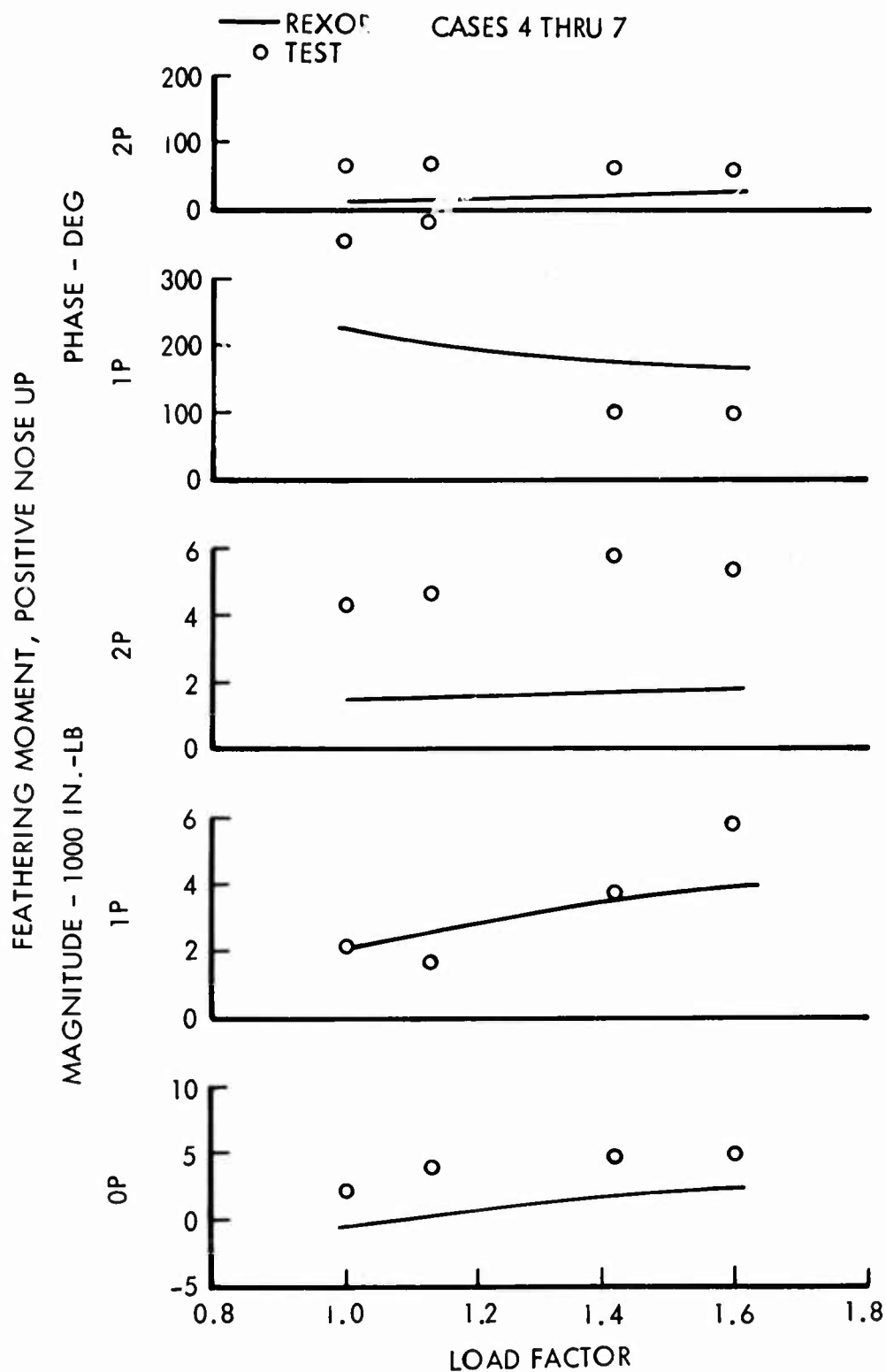


Figure 39. AH-56A Feathering Moment vs. Load Factor.

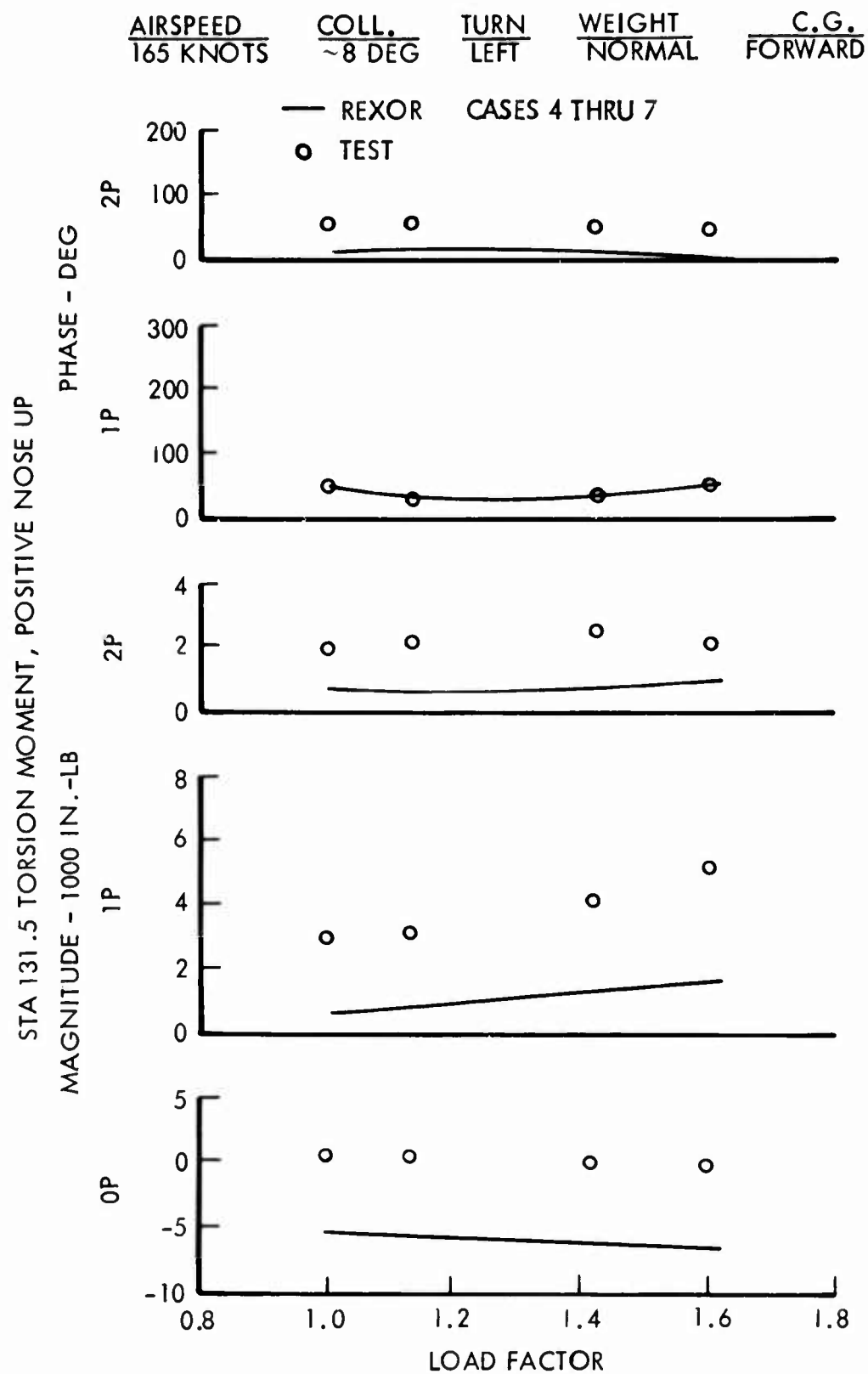


Figure 40. AH-56A Blade Sta 131.5 Torsion Moment vs. Load Factor.

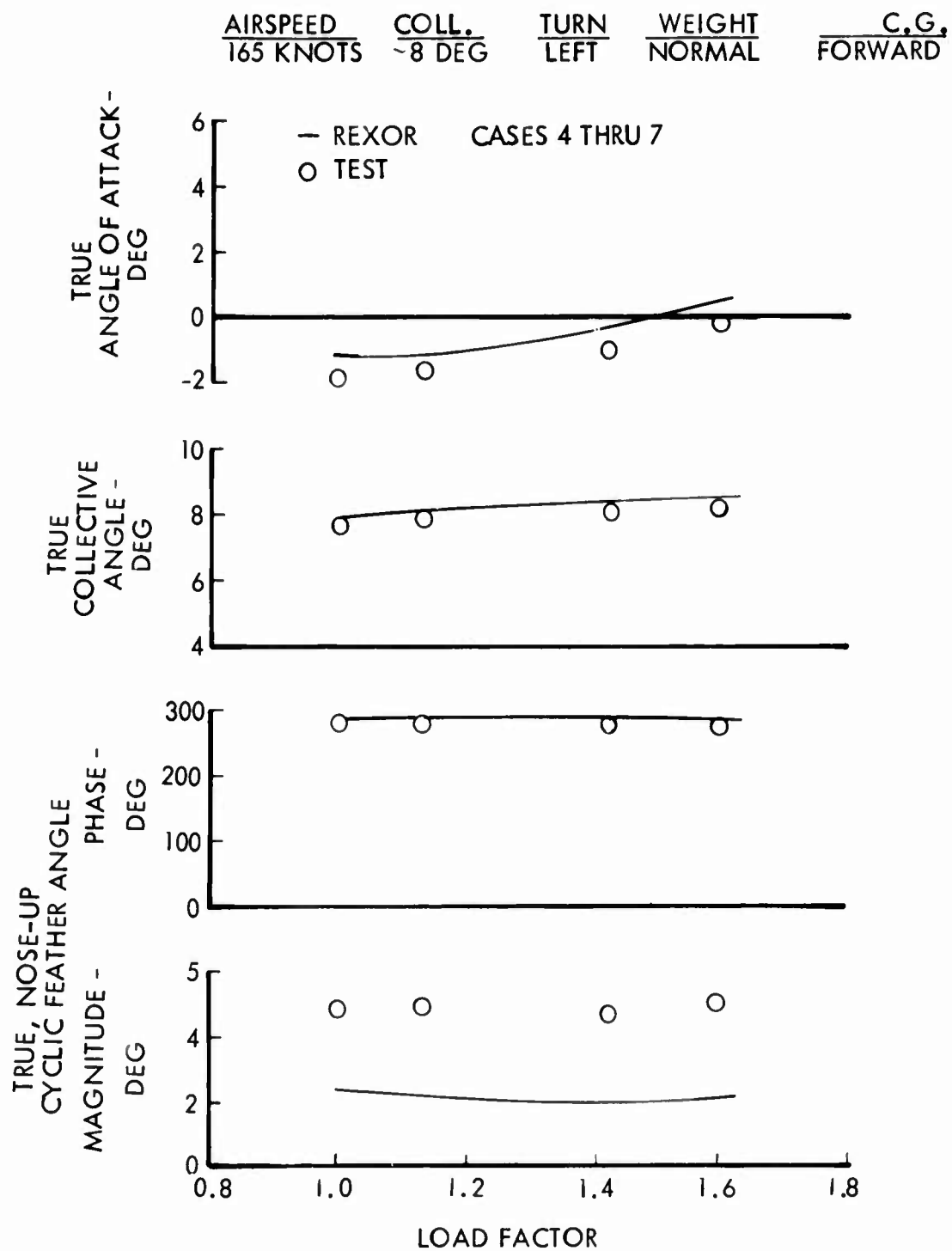


Figure 41. AH-56A Main Rotor Trim Angle vs. Load Factor.

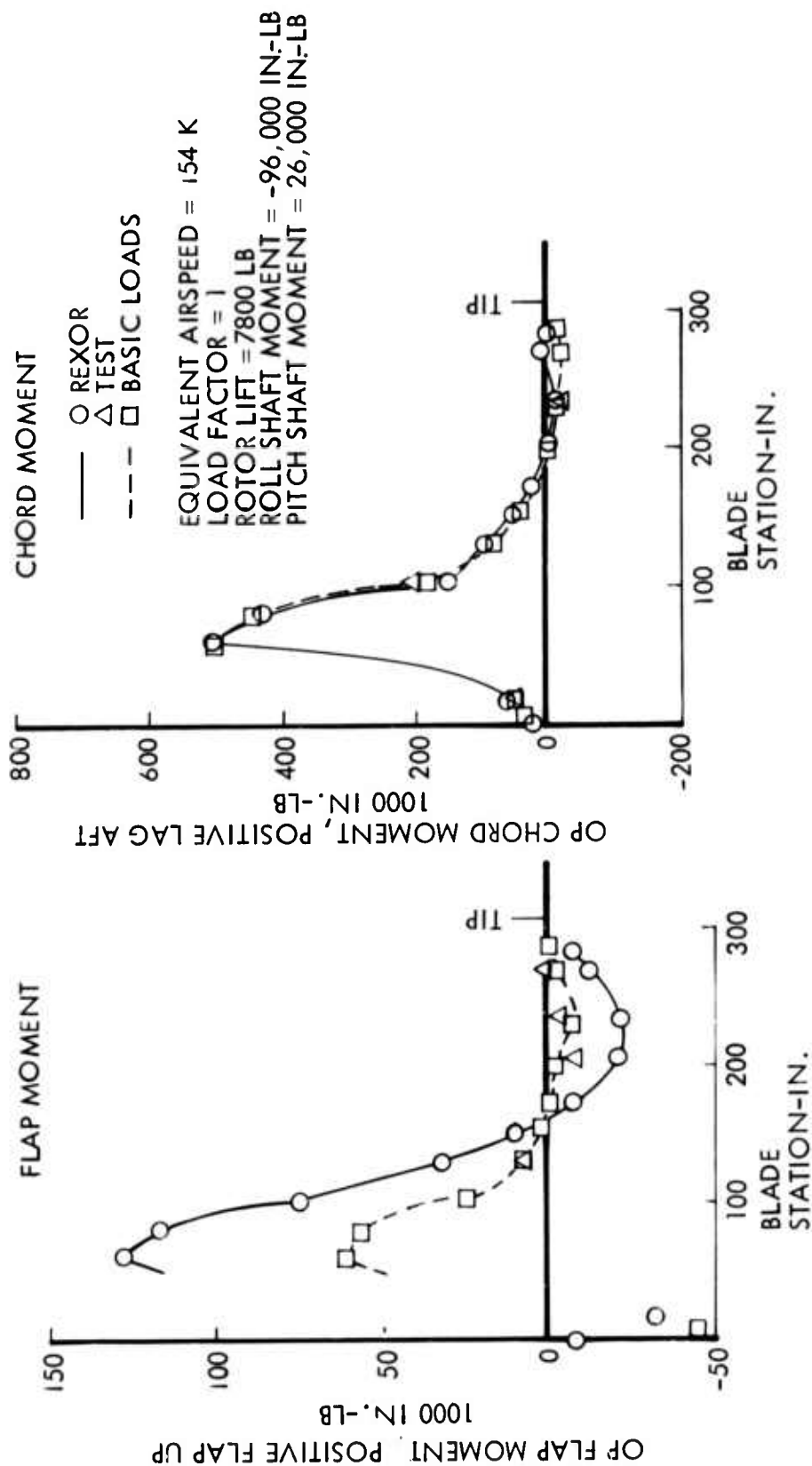


Figure 42. AH-56A OP Flap and Chord Moment vs. Blade Station ~ Case 1.

FLAP MOMENT, POSITIVE FLAP UP

MAGNITUDE - 1000 IN.-LB

PHASE - DEG

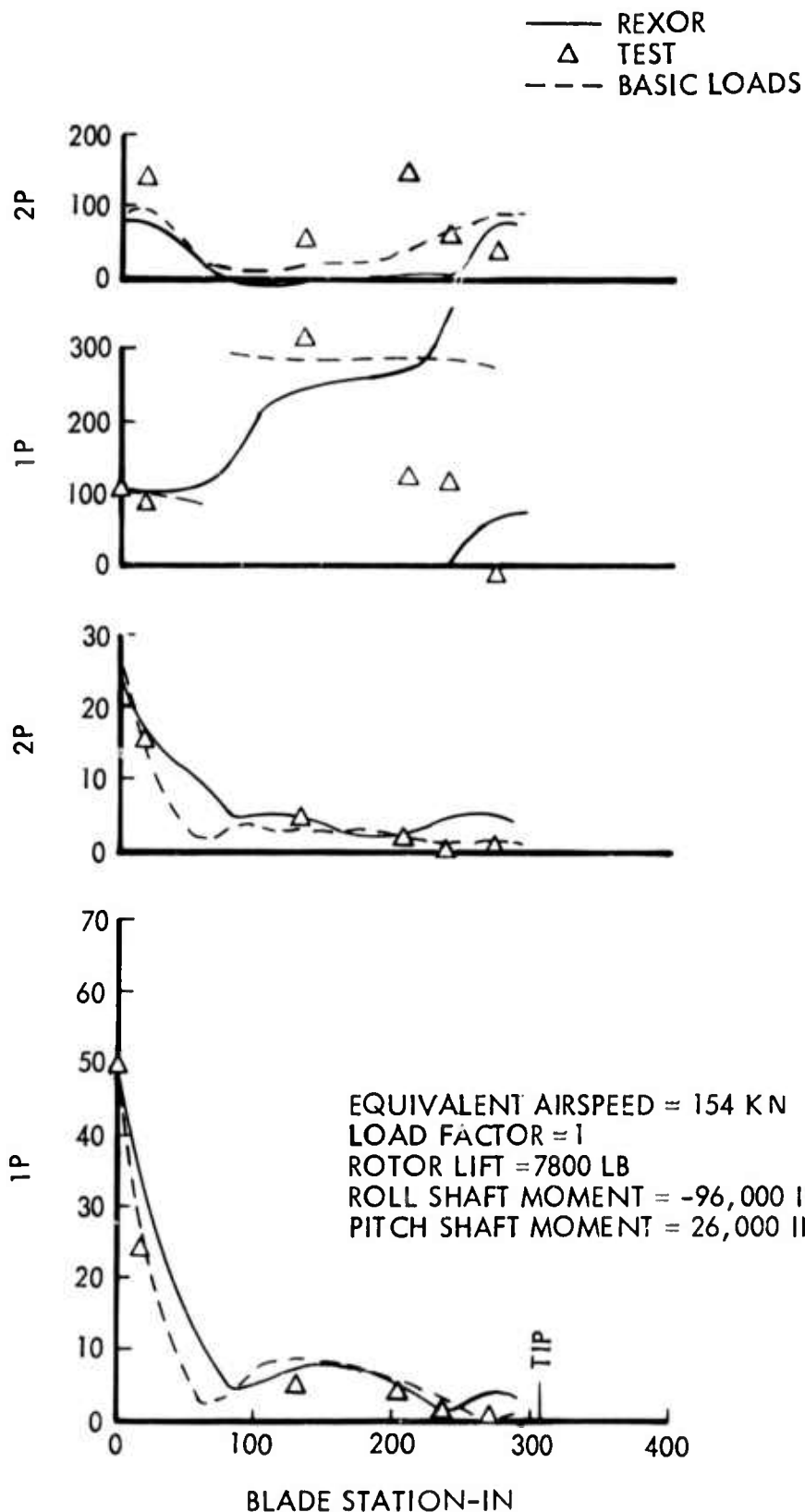


Figure 43. AH-56A 1P and 2P Flap Moment vs. Blade Station ~ Case 1.

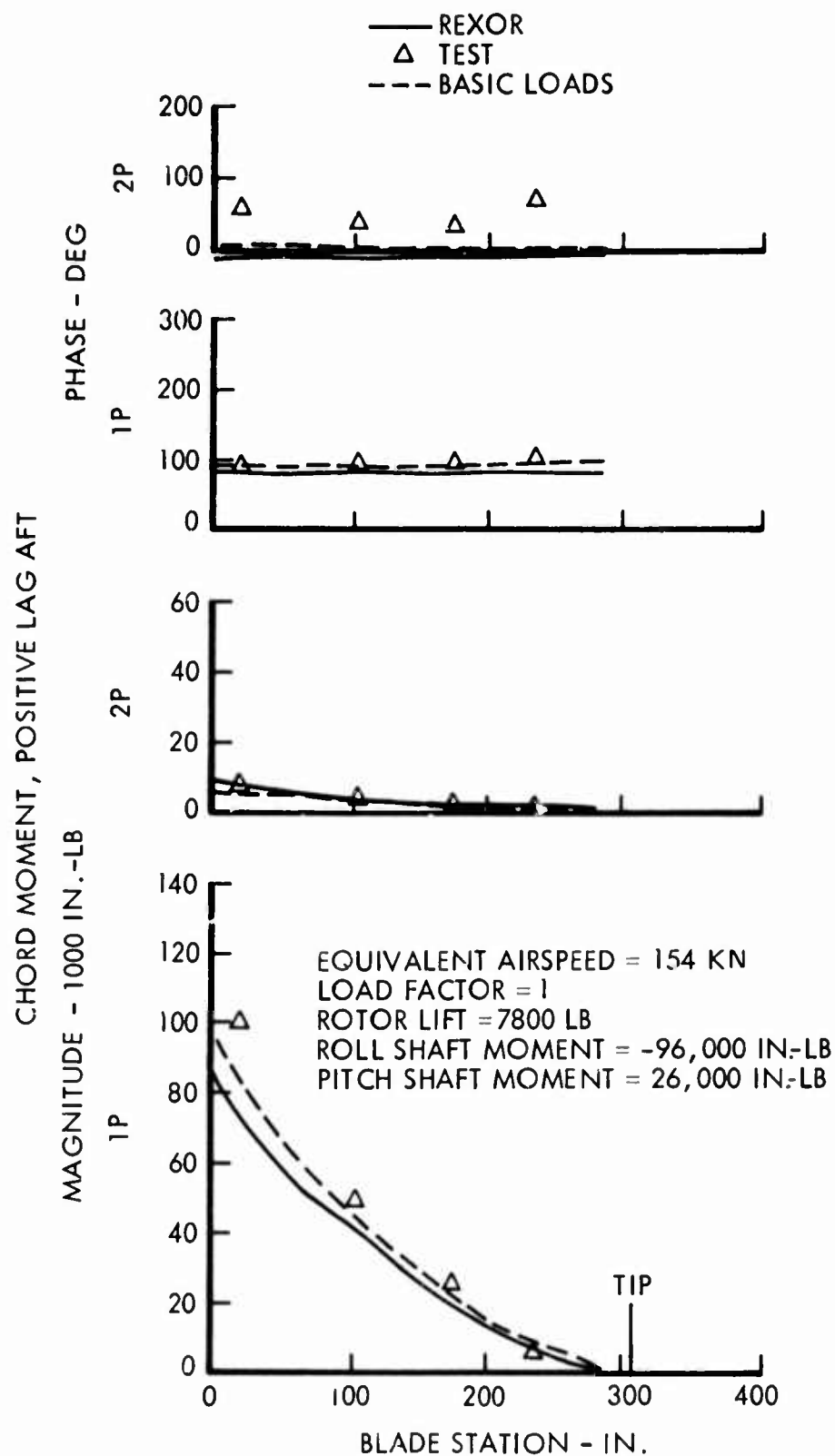


Figure 44. AH-56A 1P and 2P Chord Moment vs. Blade Station ~ Case 1.

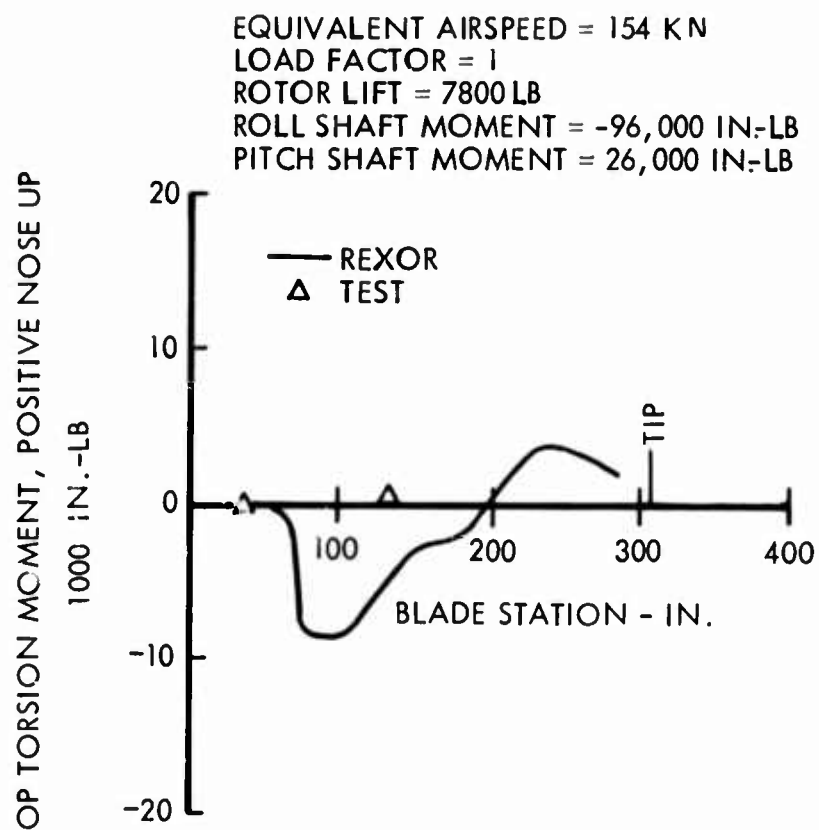


Figure 45. AH-56A OP Torsion Moment vs. Blade Station ~ Case 1.

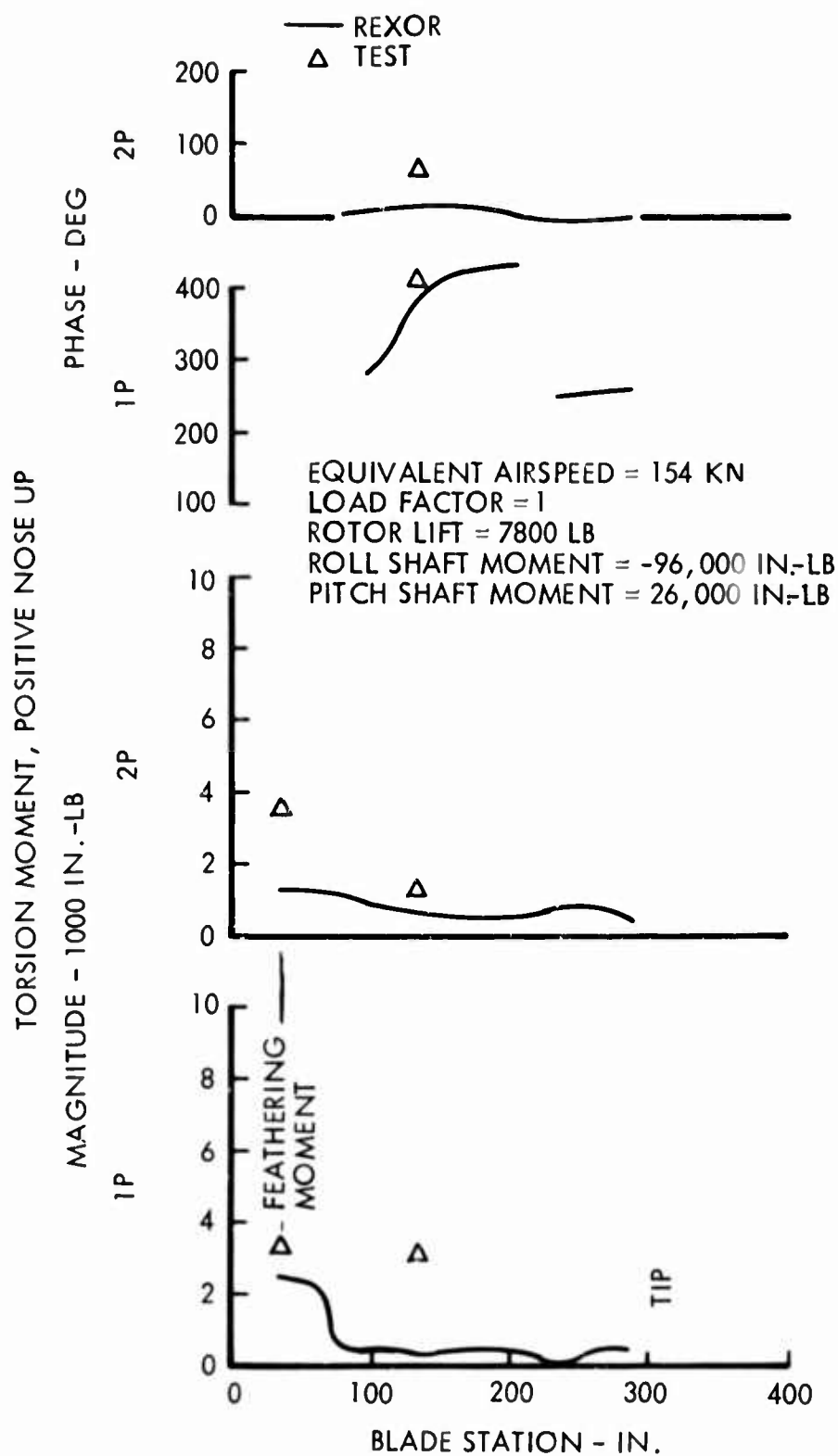


Figure 46. AH-56A 1P and 2P Torsion Moment vs. Blade Station ~ Case 1.



moments; Figure 44, the 1P and 2P chordwise moments; Figure 45, the steady torsion moments; and Figure 46, the 1P and 2P torsion moments. It is noted for 1P and 2P moments that both amplitude and phase are compared.

A review of Figures 29 through 32 and 35 through 38 shows that overall correlation on flapping and chordwise bending moments is fairly good for these steady-state conditions. This is true for both absolute levels and trends with forward speed and load factor.

The flapwise bending moments computed internally at station 18 in REXOR were effectively the total moment acting across the fixed hub and tension-torsion (T-T) pack at that station. The end kick shears of the T-T pack were included in the internal load balance and generalized forces in the system, but were not included in the specific integration for loads at station 18 since this integration included only external loads and not internal loads. A correction was therefore made to the REXOR computed flapping moments at station 18 to account for the internal load of the T-T pack. This correction was found to have a significant effect on steady moments, a lesser effect on 1P flapping moments, and 5 percent or less effect on 2P flapping moments at station 18. Therefore, it was only necessary to apply the correction to the steady and 1P moments.

#### Correlation With Forward Speed

Figure 29 shows that fairly good correlation is achieved between the measured OP, 1P, and 2P flapping moments at station 18 (approximately 0.06R) and the predicted moments. Steady moments, which are not particularly critical loads, are seen to be in very good agreement. The first harmonic moments at station 18 predicted by REXOR are 20 to 30 percent higher than the measured levels, with the phase angle showing very good agreement. It is believed that the predicted 1P flapping moments at station 18 are apparently high due to the limitation imposed on blade deflections by only including three blade modes (2 flapwise and 1 in-plane), or less importantly, by the radial loading stations being limited to 12. This has been demonstrated by the Rotor Blade Loads analysis of the same test conditions where the blade was described by this analysis with approximately 60 stations. The measured and computed loads with this method fell within 5 percent of each other as shown in Figure 43. Subtleties involved in defining 1P bending deflection shape include coupling effects such as the products of 1P cyclic feathering times the blade forward sweep. This results in a sharp discontinuity in the vertical deflection of the blade at the point where the blade sweep occurs. This discontinuity is not well represented by the deflections allowed in a first- and second-mode bending formulation. As a result, errors are generated which cause some error in the predicted distributed 1P flapping moments in the REXOR program. These differences in moment are readily identified by comparisons with the Rotor Blade Loads program. Once noted, the differences can then be applied to results of transient solutions, the principal purpose for applying REXOR as a loads analysis tool.

The amplitudes of the 2P flapping moments, as seen in Figure 29, agree quite well. However, differences do exist between the measured and predicted 2P

phase angle. This phase difference is attributed to several factors. The primary contributor is differences in cyclic blade angle required for trim, Figure 41. The error in cyclic blade angle on the AH-56A has not been totally resolved but could be due to an inadequate accounting of inflow effects associated with the forebody shape and its proximity to the main rotor, the wing downwash, and the method for accounting for propeller inflow. The forebody proximity to the rotor and the propeller influence are peculiar to the AH-56A configuration.

Referring to Figure 30, good agreement was obtained between measured and predicted blade chord moments as a function of airspeed. The biggest discrepancy in loads occurred at the low-speed end. Here, the nominal collective setting was only 6 degrees. This means that rotor lift must be obtained to a large degree by angle of attack of the rotor. Any error in collective setting will result in large differences in rotor angle of attack. For this condition, REXOR trimmed to an angle of attack that was approximately 3 degrees higher than the measured value, thus causing REXOR to be in a more autorotative state than the test vehicle. This resulted in the smaller predicted steady chordwise bending moment at the low-speed points. At higher speeds, any differences in collective setting result in a much lower discrepancy in rotor angle of attack.

Figures 31 and 32 show the flap and chord moment comparison at rotor station 174 for these same forward speed conditions. It is noted that flapping moment at station 174 was only available on the high-speed 204 KEAS test condition. Also, chord moment at this station was not available for the low-speed test point. The results show very good correlation for 1P and 2P phase angles.

Figures 33 and 34 give correlation between test and analysis for the same speed conditions for blade torsion moment at rotor station 131.5 and for feathering moment respectively. The steady and 1P feathering moments show reasonable agreement, with the 2P moments showing less agreement. Poor agreement is also shown for steady, 1P, and 2P harmonics of blade torsion moment.

Blade torsion moment at station 131.5 is affected on a first-order basis by pure torsion moments on the blade and secondarily by effects of the product of flapping and/or chordwise deflections times chordwise and/or flapping moments. In contrast, for the feathering moment, each of these is a first-order effect. In review of the torsion moments (referring again to Figure 34), it is seen that predicted steady moments are more nose down than the values measured. Study of the azimuthal histories revealed that 1P predicted moments on the advancing side of the rotor were more nose down than measured, with this discrepancy increasing with airspeed. Both of these discrepancies could be compensated for in the analysis with a larger, more positive value of  $C_{M0}$  for the airfoil to account for tracking tab

setting. The AH-56A rotor blades are equipped with fairly large tracking tabs. These tabs are easily capable of producing increments of steady torsion or feathering moments of  $\pm 3,000$  inch-pounds in hover. For a given radius or rotor station  $r$ ,  $TM_{OP}$  and  $TM_{LP}$ , the OP and LP aerodynamic torsion moment due to  $C_{Mo}$ , can be written in terms of  $TM_{HOVER}$ , the hover value, as follows:

$$TM_{OP} = (1 + \mu_r^2/2) TM_{HOVER}$$

and

$$TM_{LP} = \mu_r TM_{HOVER}$$

where  $\mu_r$  is the equivalent advance ratio at station  $r$ . At  $\mu_r = 0.5$  or approximately 180 KEAS, a steady moment of 1125 inch-pounds and a LP moment of 500 inch-pounds would result due to each 1,000 inch-pounds of hovering  $C_{Mo}$  torsion moment due to tab setting.

The correlation analysis presented was all performed with an analytical tab setting which produced the test value of collective control load in hover. This analytical tab setting is lower than that measured on the test vehicle. If the test setting were used, the computed collective control load would be reduced between 1,000 and 1,500 pounds tension, which is equivalent to 1,700 to 2,550 inch-pounds of blade torsion moment for the hovering case. Because of this, the analytical setting which matches hover control loads was used. If the measured tab setting had been used, at 180 KEAS an increment of steady nose-up torsion moment of 2,400 inch-pounds and a LP torsion moment of 1,060 inch-pounds nose up on the advancing blade would result. Combining these load increments with the predicted torsion moments in Figure 33 would improve correlation of the magnitude of both the steady and LP torsion moments and the phase of the LP torsion moments.

Another item affecting the LP torsion moment is aerodynamic pitch rate damping due to cyclic feathering. The higher experimental cyclic blade trim angles compared to the REXOR trim angles result in fairly significant increments of nose-up feathering in the right rear quadrant of the rotor system. This effect would further enhance the degree of correlation obtained on the LP torsion moments in level flight. The magnitude of this vector can range from 1,000 to 2,000 inch-pounds of torsion moment and is in a direction to improve this prediction.

The mechanisms producing feathering moments include the same items that result in blade torsion moments and additionally significant contributions due to the product of flapping and in-plane moments times in-plane and flapping deflections, both geometric and elastic. Referring to Figure 30, at 120 KEAS the discrepancy in steady in-plane moment times the blade droop below the feathering axis for this condition would result in an increment of nose-up feathering moment. This increment of feathering moment due to

the discrepancy in the steady chord moment would disappear with increasing airspeed. This, combined with the effects on steady and 1P torsion moments discussed earlier, would bring the overall correlation of steady and first-harmonic feathering loads into much better agreement.

#### Correlation With Load Factor

Data for typical steady-state load factor penetrations are shown in Figures 35 through 41. The data are for a 165-KEAS, 8-degree collective-blade-angle flight condition, and the load factor is obtained in a steady left-bank turn. The vehicle is configured at its normal gross weight with a forward center of gravity in contrast to an aft center of gravity for the data previously discussed.

Figure 35 presents a comparison of predicted flap moments at station 118 with measured values. Good correlation is shown, both in the absolute levels of moment and in the variation with load factor. Comparing Figures 29 and 35 at the 1 g condition, the predicted 2P flapping moments increased approximately 20 percent due to the combined effect of increased shaft moment and an increase of collective pitch from 6 degrees to 8 degrees, as would be expected. In contrast, the experimental data indicated an unexplained small reduction in the 2P flapping moments.

The chord moments at station 18 are shown in Figure 36. Comparing the steady chord moments with those on Figure 30 casts some doubt on the validity of the experimental data. The 1 g point in Figure 36 shows a steady chord moment of 27,000 inch-pounds for a collective angle of 8 degrees, whereas the data in Figure 30 for a collective angle of 6 degrees indicates a level of 50,000 inch-pounds. The higher collective should require a higher rotor torque or a more aft bending steady chord moment. This requirement is reflected in the predicted station 18 steady chordwise bending moments.

The 1P chord moment amplitude and phase correlates poorly at the high load factor. The phase of the experimental data moves from a predominant lag aft in the advancing blade position at 1 g load factor, to a lag aft in the aft quadrant at the higher load factor. The poor correlation is due to the lack of agreement on cyclic blade angle discussed earlier. The higher experimental cyclic blade angles, particularly in the aft quadrant, are required basically to account for inflow distortions which cause 1P variations in the tilt of the lift vector. Figure 41 shows that the measured cyclic blade angle is approximately 2.5 times the predicted angles for the high load factor shown. The rotor lift, of course, increases with increasing load factor. The product then of the lift and the increase in inflow angle over the aft quadrant, times an effective in-plane moment arm, causes an increase in lag aft in-plane bending moment in the aft quadrant of the rotor. This effect is not present to any large degree in the REXOR predicted for this condition due to the significantly lower blade cyclic trim angles obtained by the analysis. Therefore, the REXOR analysis does not indicate a shifting of the 1P in-plane moment from a predominant lag aft bending on the advancing blade to a predominant drag aft when the blade is in the aft quadrant.

Again, where the blade cyclic trim angles are in better agreement, as in the case of the XH-51A data presented later, the 1P chord moments, both amplitude and phase, are in much better agreement.

#### Correlation With Blade Radial Station

Figure 42 presents the steady flap and chord moments as a function of rotor station for Case 1. This case is the same for the 154-KIAS point used in presenting the correlation with forward speed. Figures 29 through 34. Shown are spanwise distribution of moments from REXOR, from the Rotor Blade Loads program and from test data. Good or excellent agreement is obtained between REXOR, and Rotor Blade Loads program, and the test data for the steady chord moment distribution. The chordwise bending moments are not heavily dependent upon the deflection of the blade. In contrast, for steady flap moments, where the moments are strongly dependent upon blade flexibility and the associated contribution of centrifugal force, the correlation between the REXOR results and the rotor loads program and test data is not as good. This is particularly true in the region of rotor station 60 to 70 where the blade built-in droop occurs. It is apparent that incorporation of a static or steady mode, or higher modes into REXOR would greatly improve its ability to predict spanwise distribution of steady flapping moments. The discrepancy is primarily due to the lack of blade deformation sufficient to relieve the steady centrifugal flapping moments, and so that trends with load factor, airspeed, etc., as has been earlier demonstrated, are valid.

Referring to Figure 43, where the forced response is much closer to the natural mode response, much better agreement in 1P flapping moments is obtained between the REXOR, test and Rotor Blade Loads program moment distributions. In fact, as indicated in Figures 43 and 44, good correlation on the spanwise distribution of moments for both the 1P and 2P components of flap and chord moments is achieved.

Figure 45 gives a comparison of the REXOR steady torsion moments versus span, and the measured data for this same flight condition. Figure 46 is a comparison of the 1P and 2P torsion moments, amplitude, and phase. In addition to the earlier discussion on feathering and torsion moments, it is evident from Figure 42 that the REXOR computed steady flapping moment is 60,000 to 70,000 inch-pounds more flap up at station 70 than computed by the Rotor Blade Loads program. Station 70 is the span location at which the blade is swept forward 4 degrees. This increment of flapping moment times the 4-degree sweep angle produces a nose-up feathering moment of approximately 4,500 inch-pounds. Correcting for this flapping moment discrepancy would result in a steady nose-down feathering moment for the case shown in Figure 45. Referring now to Figures 33, 34, 39, and 40, a nose-down correction in the feathering moment of this magnitude combined with the nose-up correction in torsion/feathering moment due to blade-up tabbing discussed earlier, would bring the overall correlation of steady torsion/feathering moments into much better agreement. Similarly, these corrections would bring the predicted 1P torsion/feathering moment

spanwise distributions into good agreement with the measured data. The assessment of any of these effects on the 2P feathering moments is much more difficult to make since they involve much higher order effects.

The foregoing discussion has attempted to be objective in its review of the correlation data presented. The areas in which good agreement was obtained were noted, and the areas in which fair or poor agreement was obtained were highlighted. An attempt was made to give the reader a comprehensive understanding of both the capabilities and limitations of the REXOR program relative to steady-state loads predictions and, also, of the various factors which influence the correlation study both from the standpoint of mathematical modeling and from interpretation of test data. It is felt that this understanding is essential before proceeding to the part of the study involving transient maneuvering loads, which is the prime reason for applying REXOR as a loads analysis tool.

#### AH-56A TRANSIENT MANEUVERING CORRELATION RESULTS

Eight cases were selected for transient maneuvering correlation on the AH-56A. These cases included pullups at 114, 169 and 180 KEAS, pushovers at 123, 176 and 183 KEAS, a right roll maneuver at 161 KEAS, and a left roll maneuver at 122 KEAS.

The pullups, in order of the speeds indicated above, are given in Figures 47, 52, and 53; the pushovers, in Figures 48, 51 and 54; and the rolling maneuvers, in Figures 49 and 50. The correlation data is presented on two separate pages, an (a) and a (b) figure, for each condition or maneuver. The (a) portion of each figure presents time histories of flight condition data such as vertical acceleration, angle of attack, roll and pitch rates, and stick positions. The (b) portion of each figure presents time histories of main rotor blade loads, including feathering moment, torsion at station 131.5, chordwise and flapwise bending at station 18 and station 174, and a rotor index pip which references when the subject blade is straight aft at the zero azimuth position.

The transient maneuvers on REXOR were performed by selecting a particular flight condition parameter and attempting to fly REXOR with the cyclic stick to match the maneuver. For pullups and pushovers, the center of gravity vertical acceleration was chosen with attention also given to pitch rate and roll rate. For rolling maneuvers, roll rate was the prime parameter selected to which to fly REXOR. The initial REXOR time histories generated used measured stick motions from the flight test maneuvers. Usually it was found that some modest correction or change in stick positions was required to give reasonable duplication of the flight condition. The degree to which the AH-56A transient maneuvers were duplicated can be seen by reviewing the (a) portions of Figures 47 through 54.

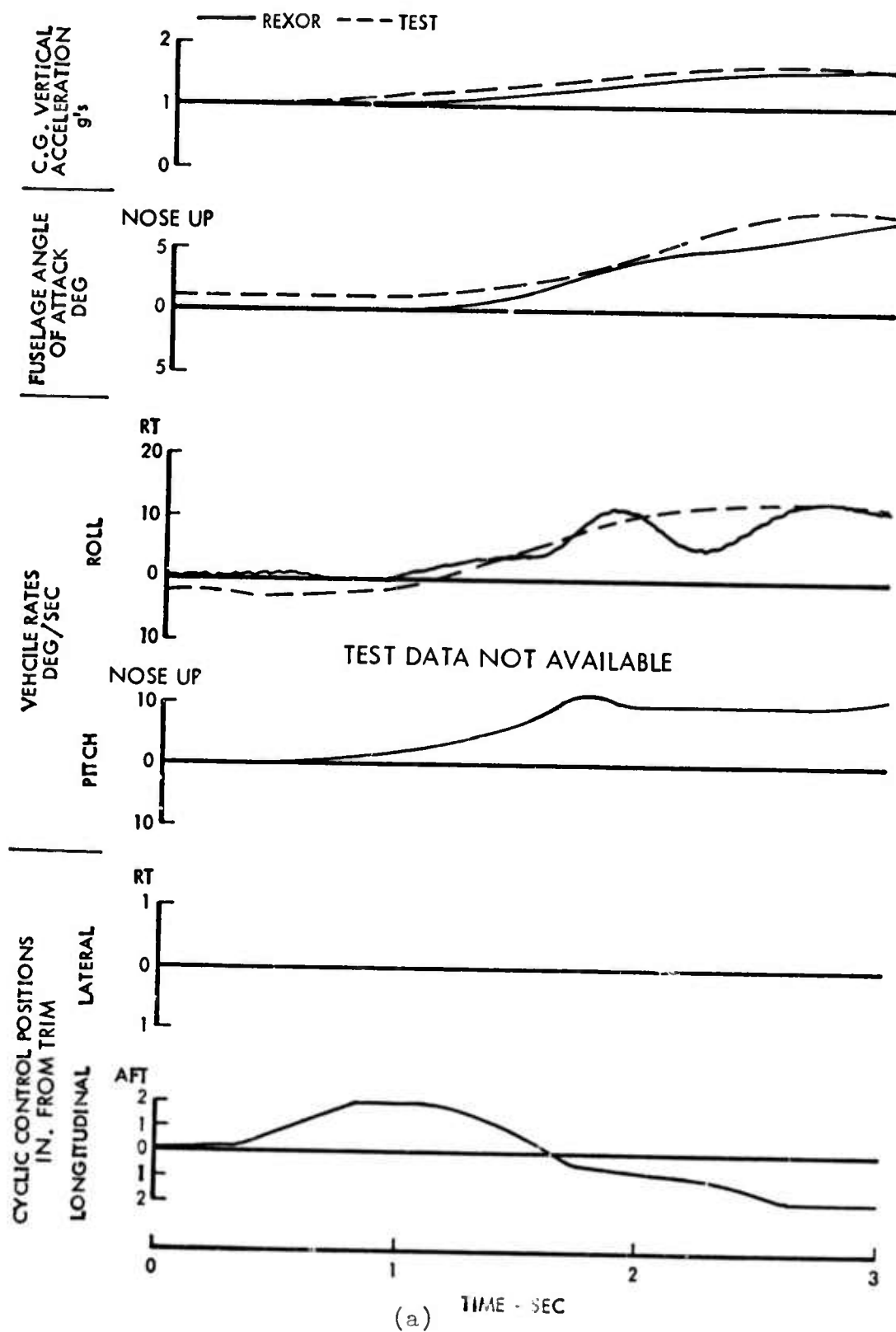
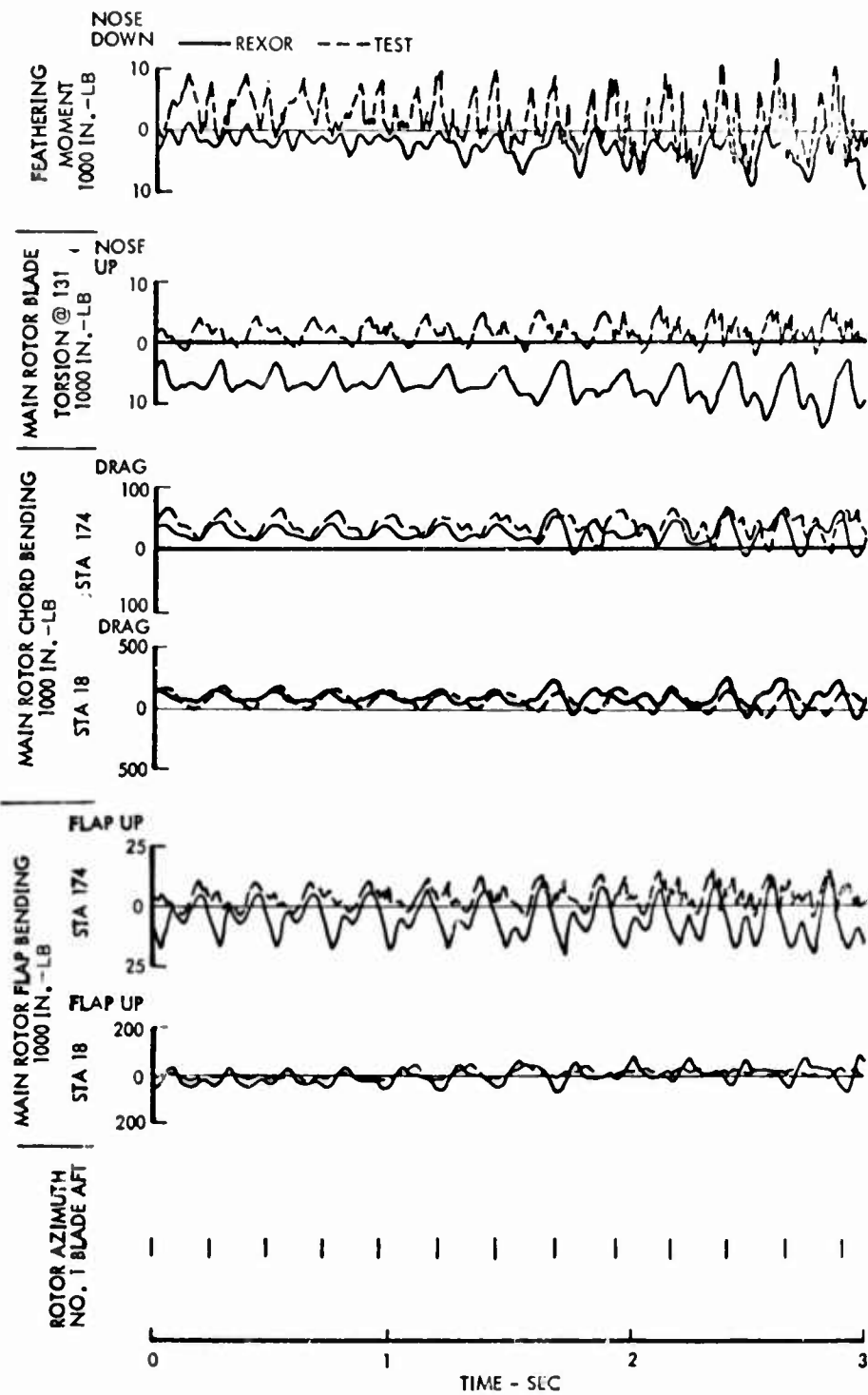


Figure 47. AH-56A Transient Maneuver, Pullup - Case 51.

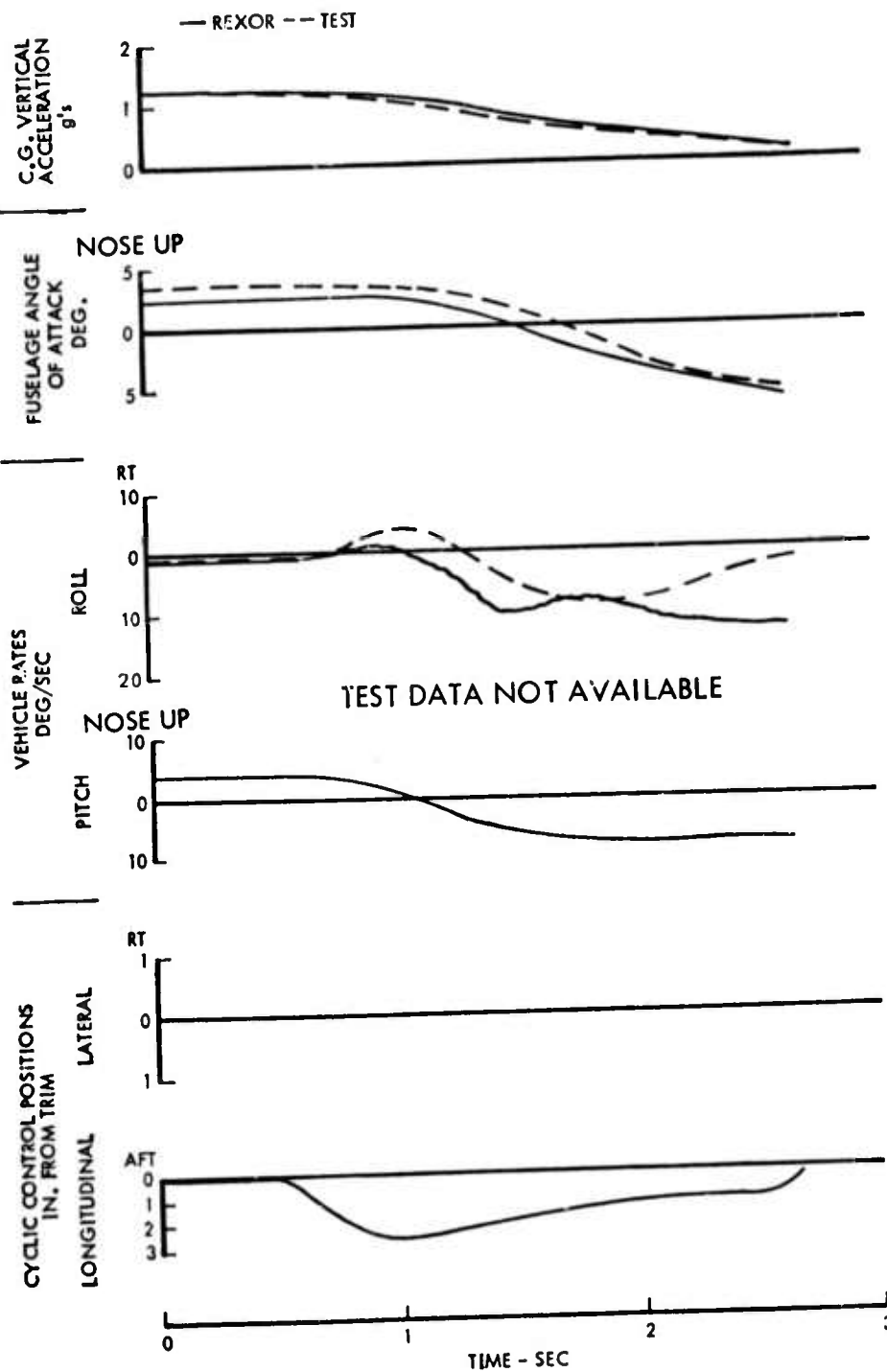




(b)

Figure 47. Continued.





(a)

Figure 48. AH-56A Transient Maneuver, Pushover ~ Case 50.

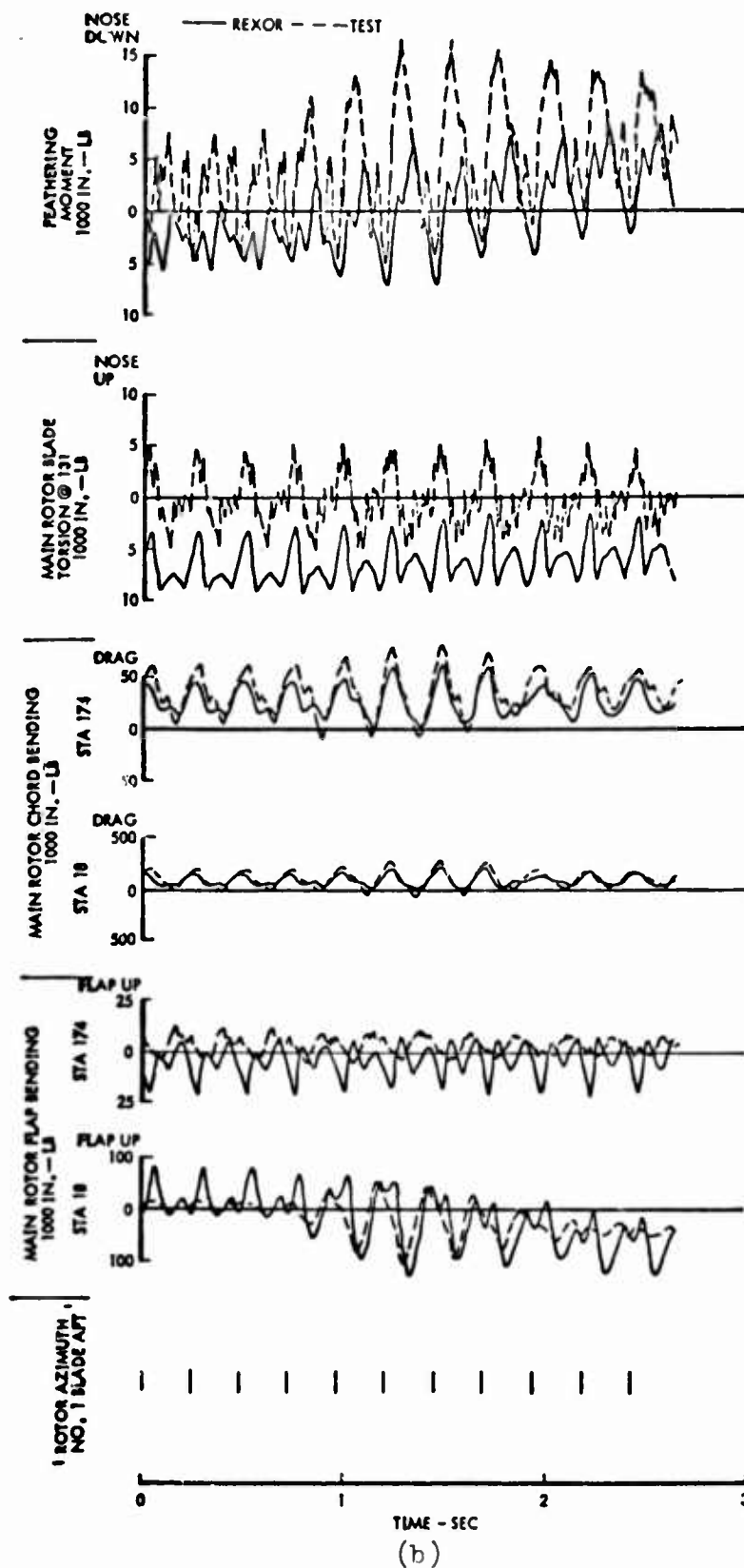
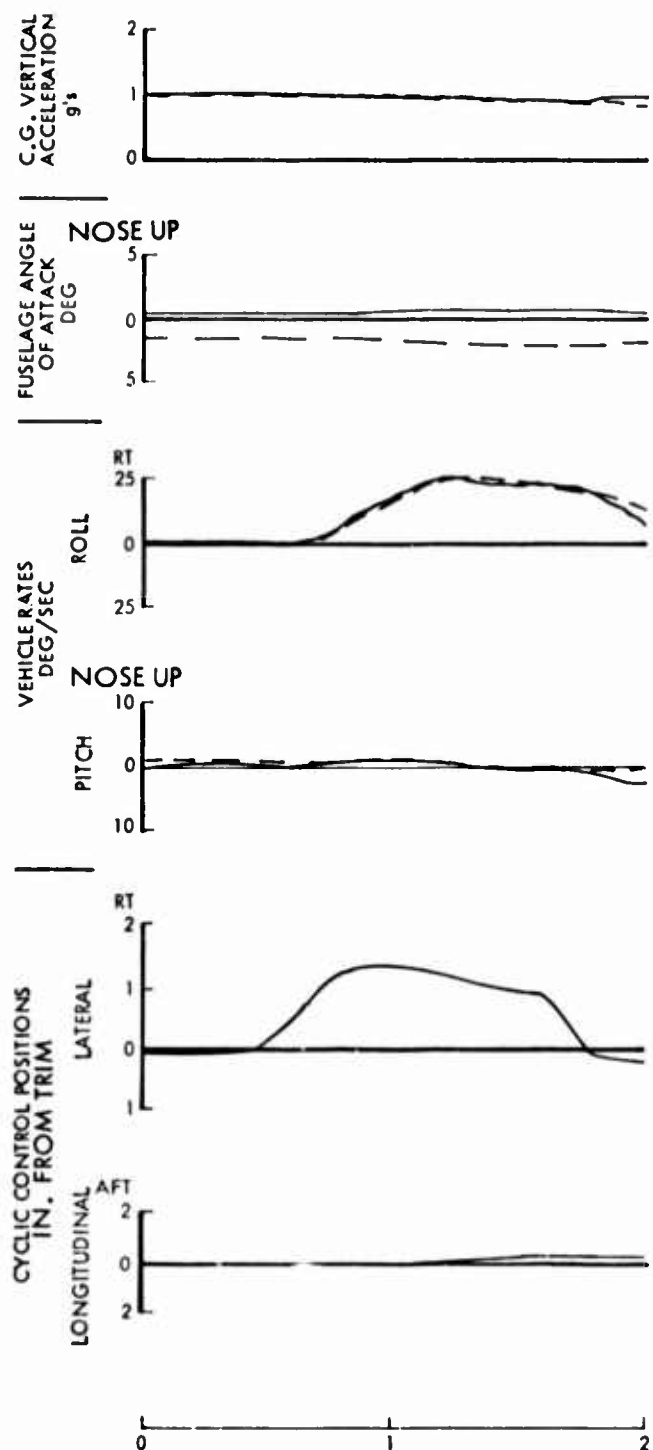
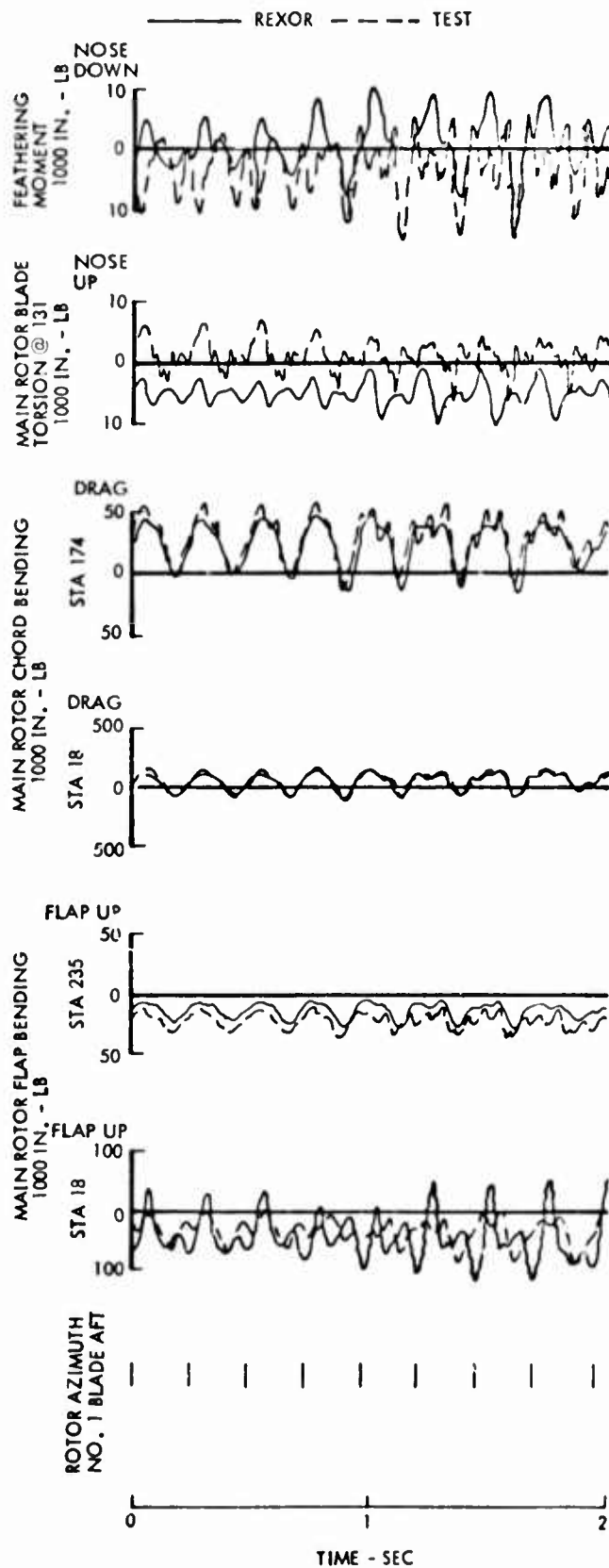


Figure 48. Continued.

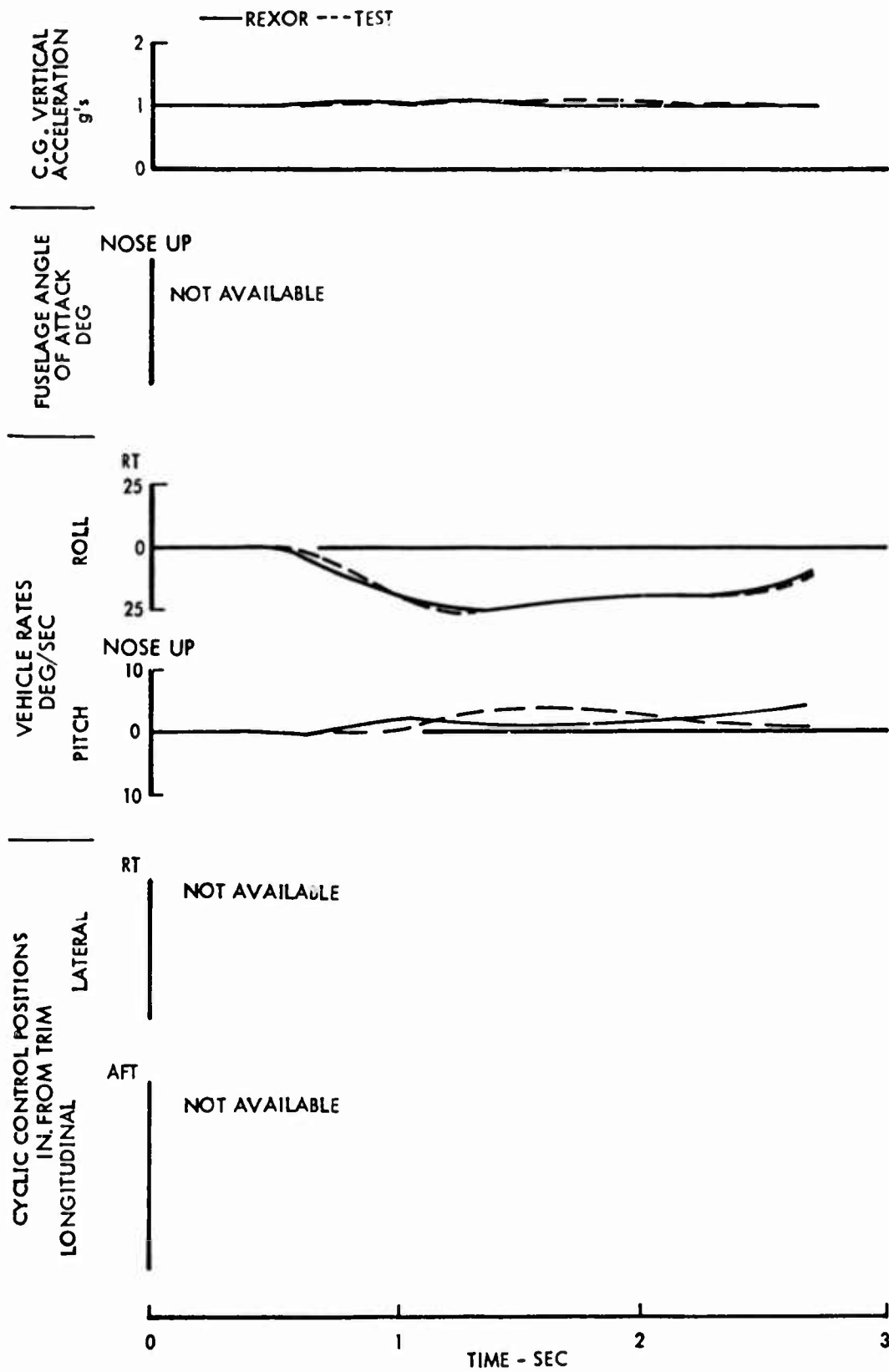


(a)

Figure 49. AH-56A Transient Maneuver, Right Roll - Case 47.

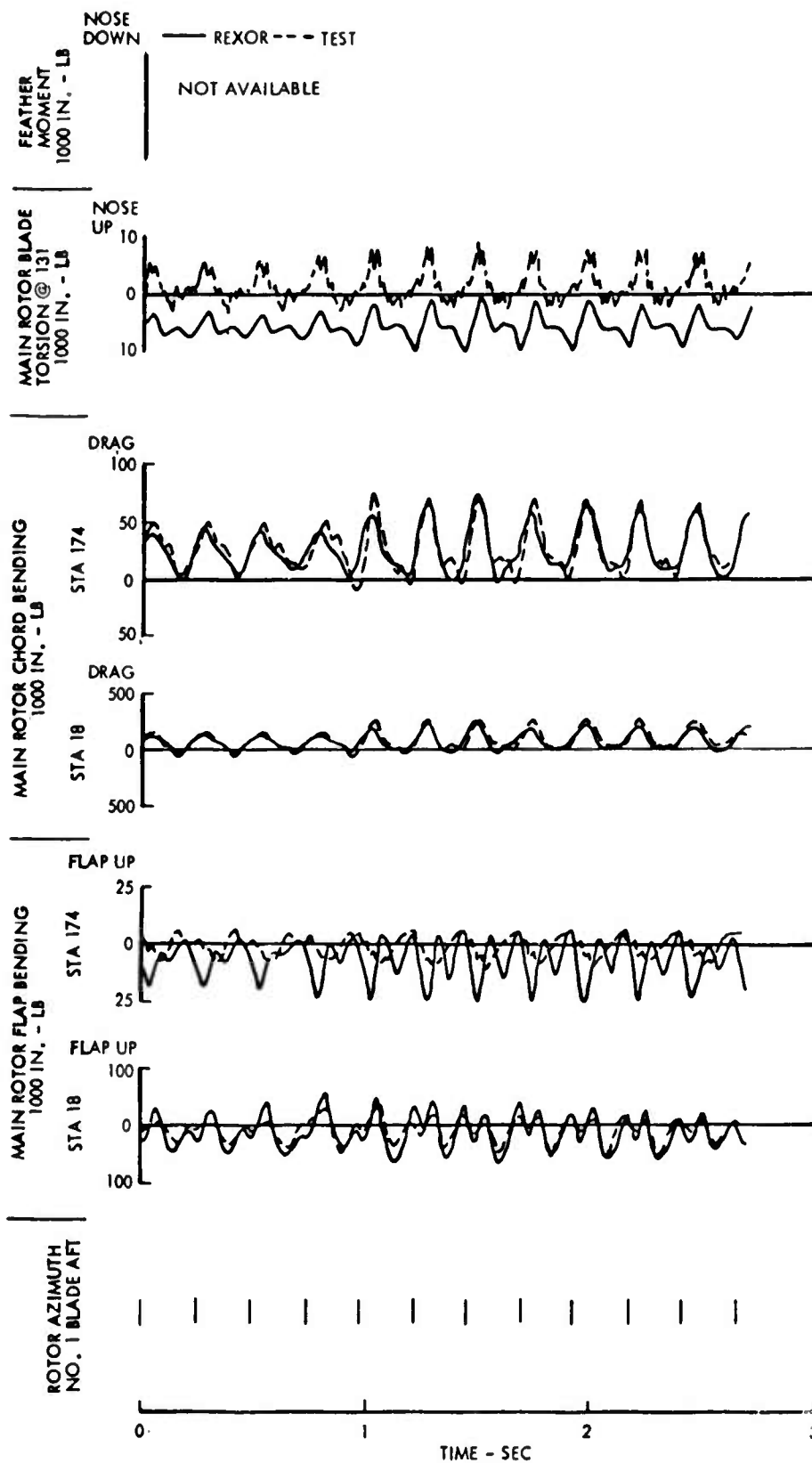


(b)  
Figure 49. Continued.



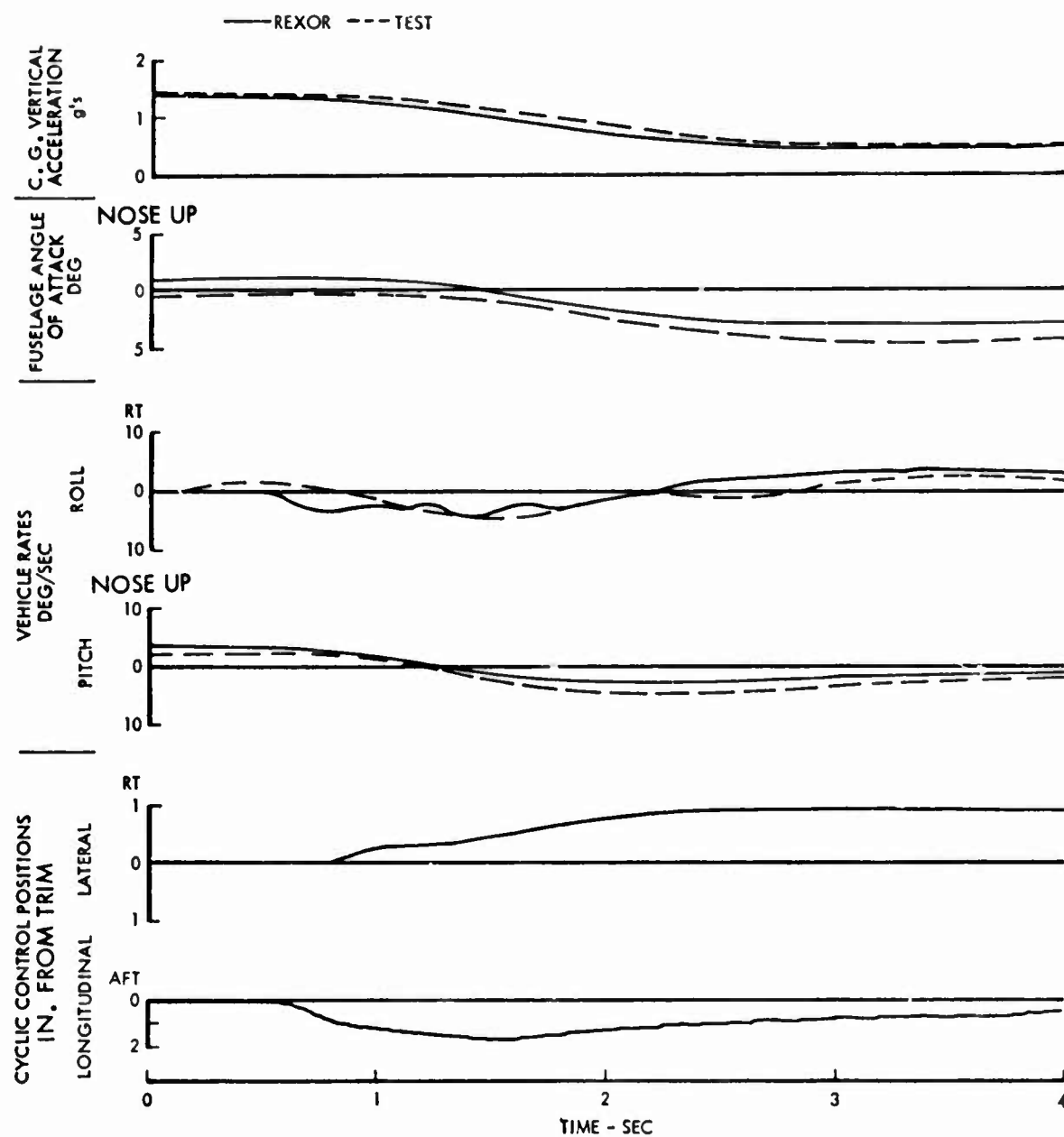
(a)

Figure 50. AH-56A Transient Maneuver, Left Roll ~ Case 48.



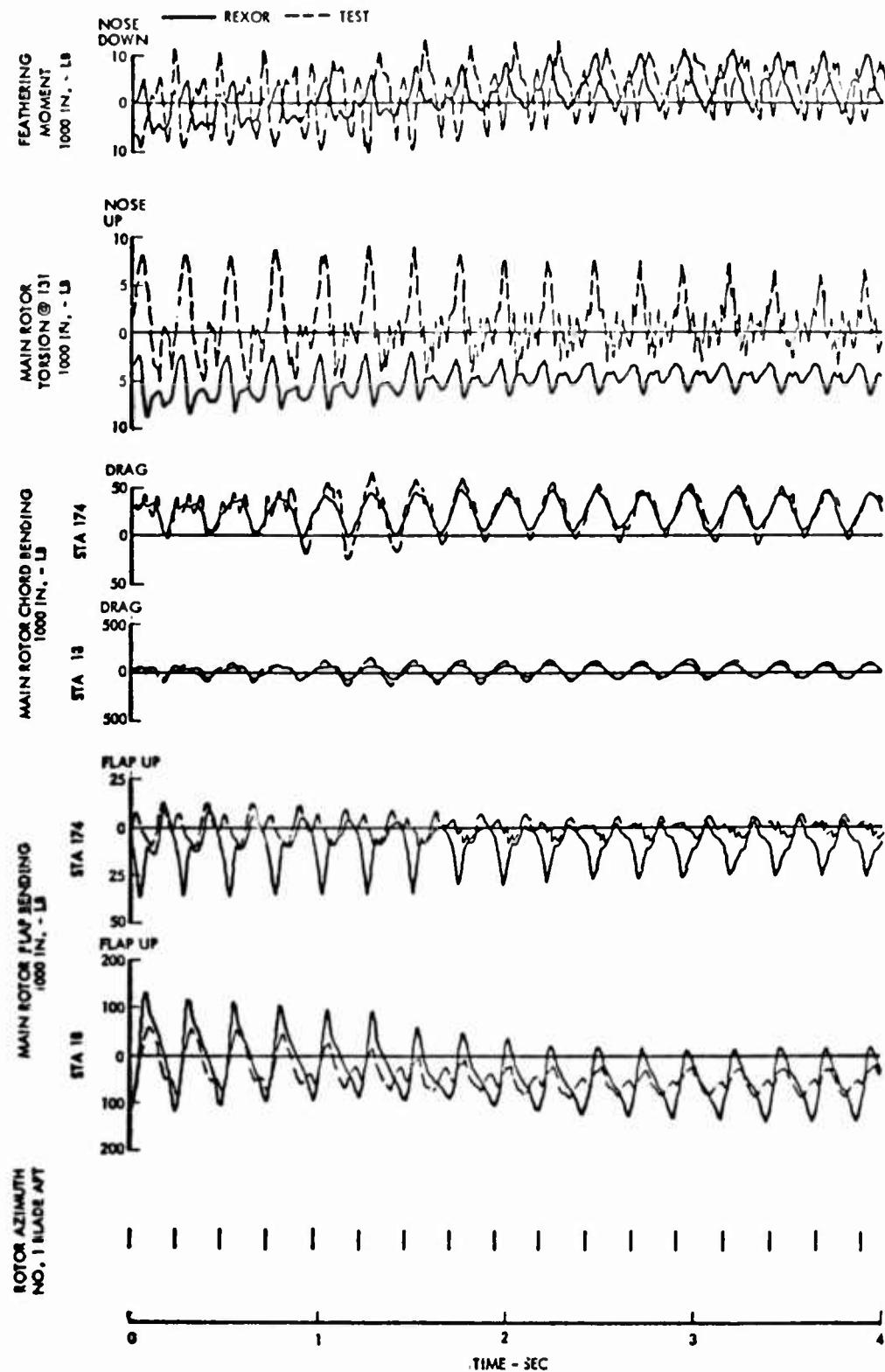
(b)

Figure 50. Continued.



(a)

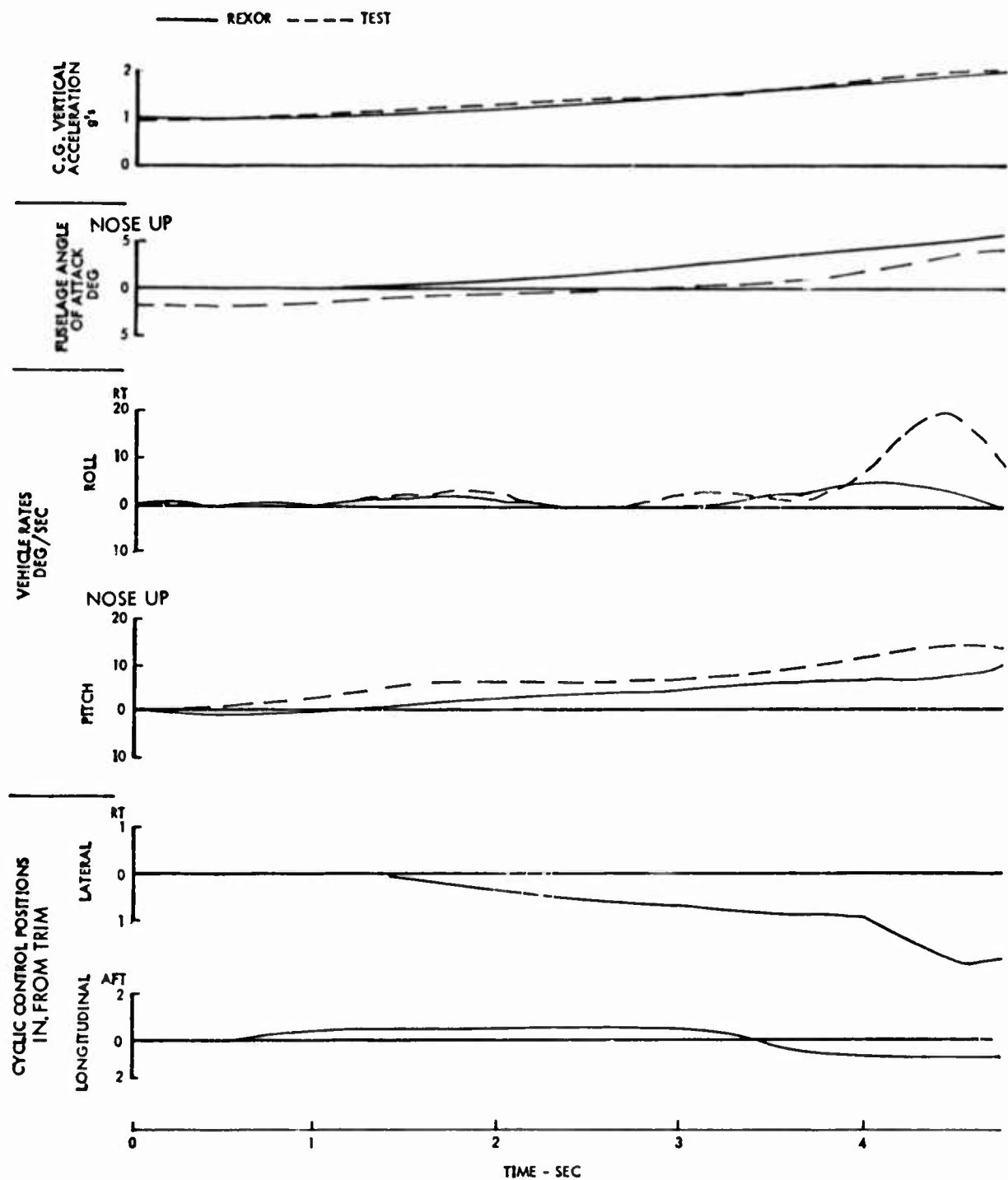
Figure 51. AH-56A Transient Maneuver, Pushover - Case 49.



(b)

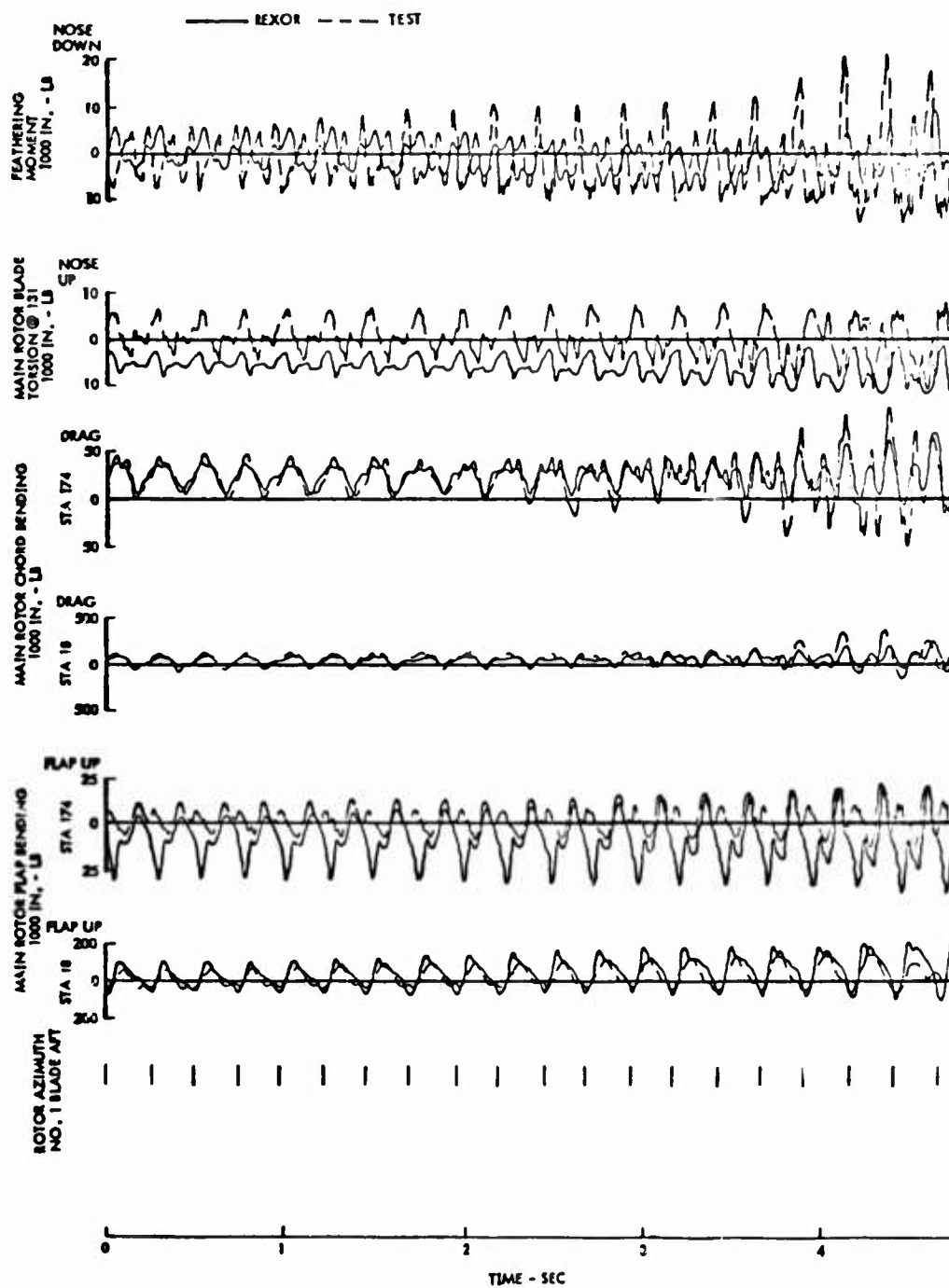
Figure 51. Continued.





(a)

Figure 52. AH-56A Transient Manuever, Pullup - Case 50.



(b)

Figure 52. Continued.

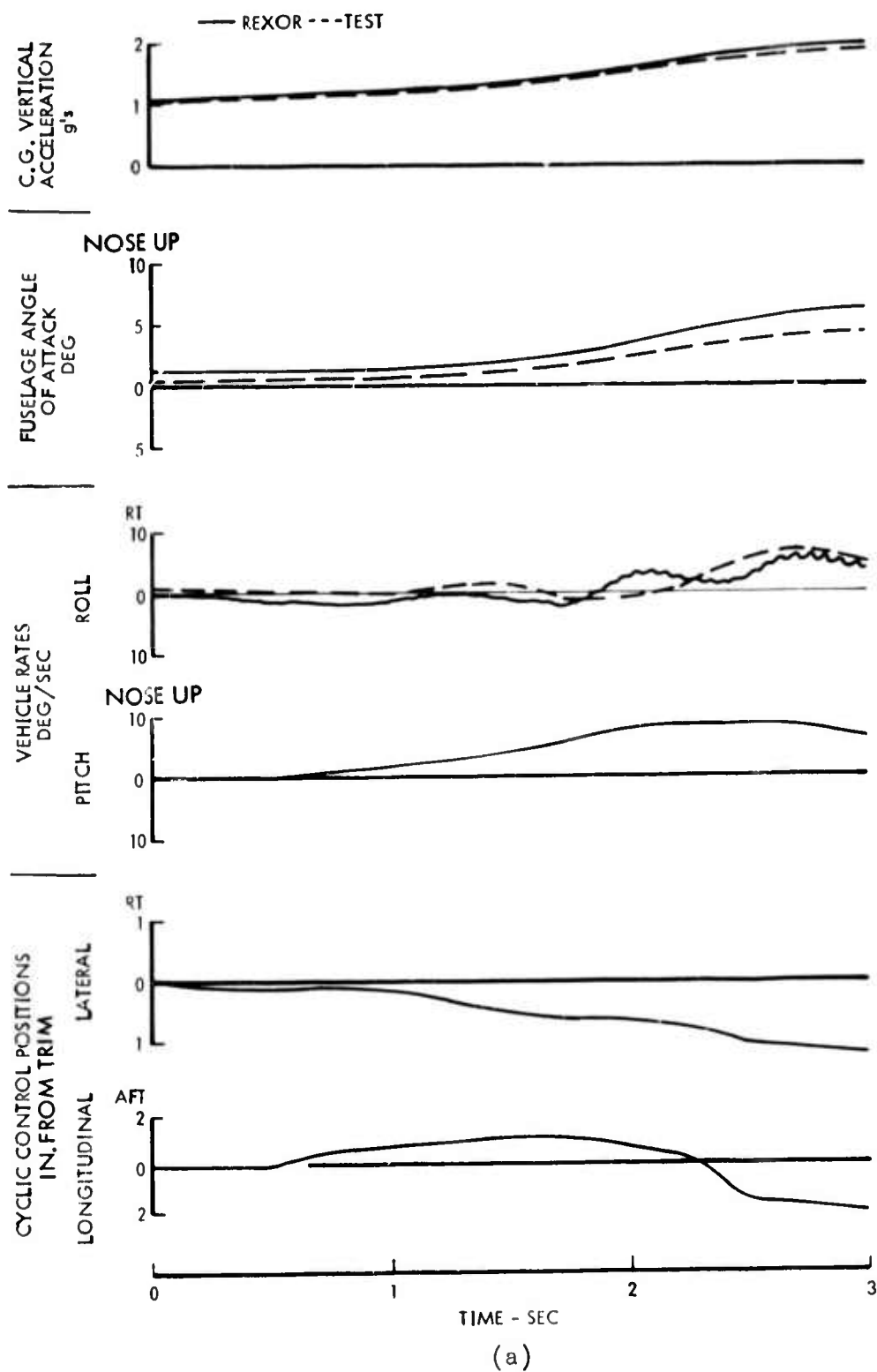


Figure 53. AH-56A Transient Maneuver, Pullup - Case 45.

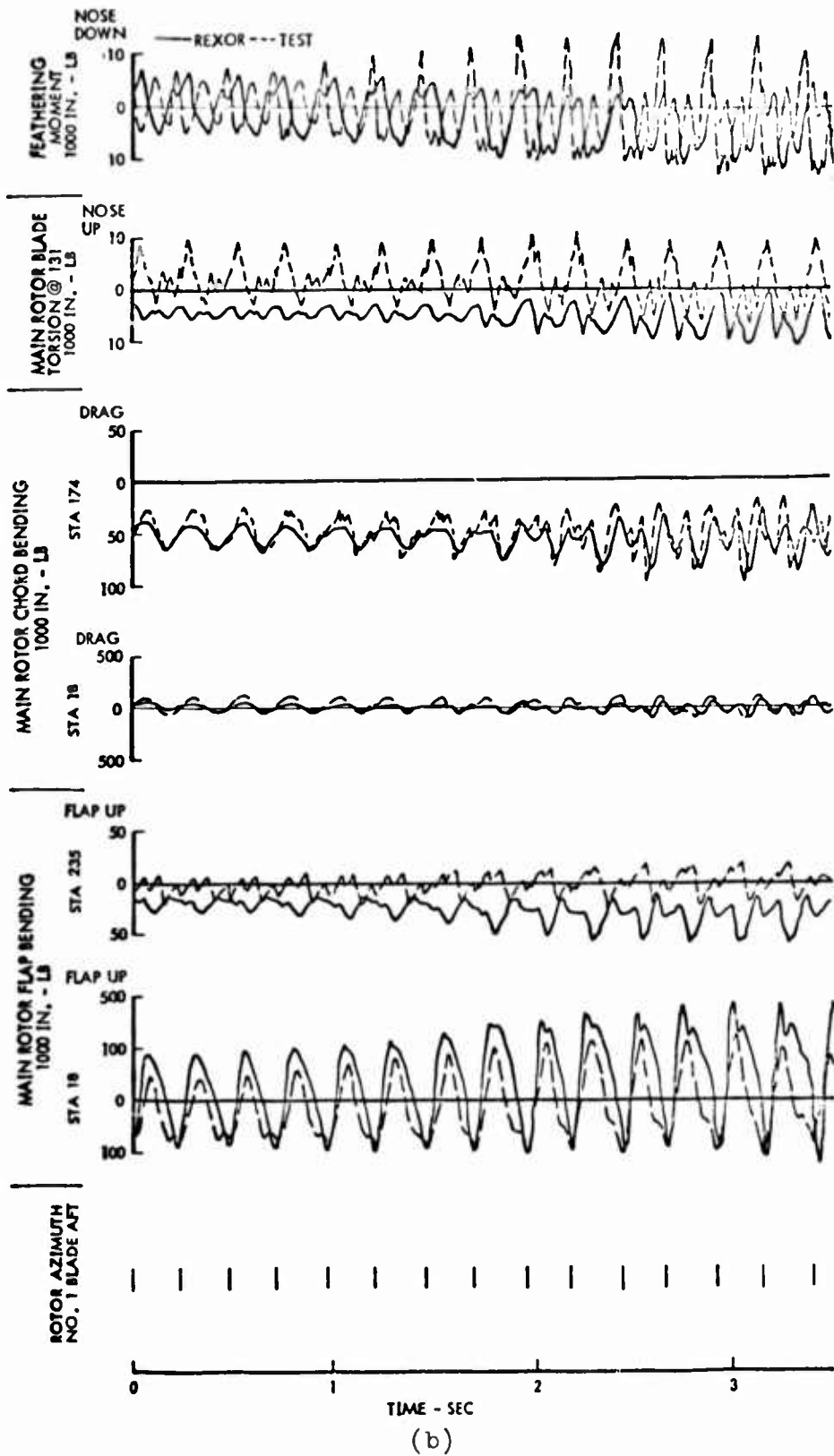


Figure 53. Continued.

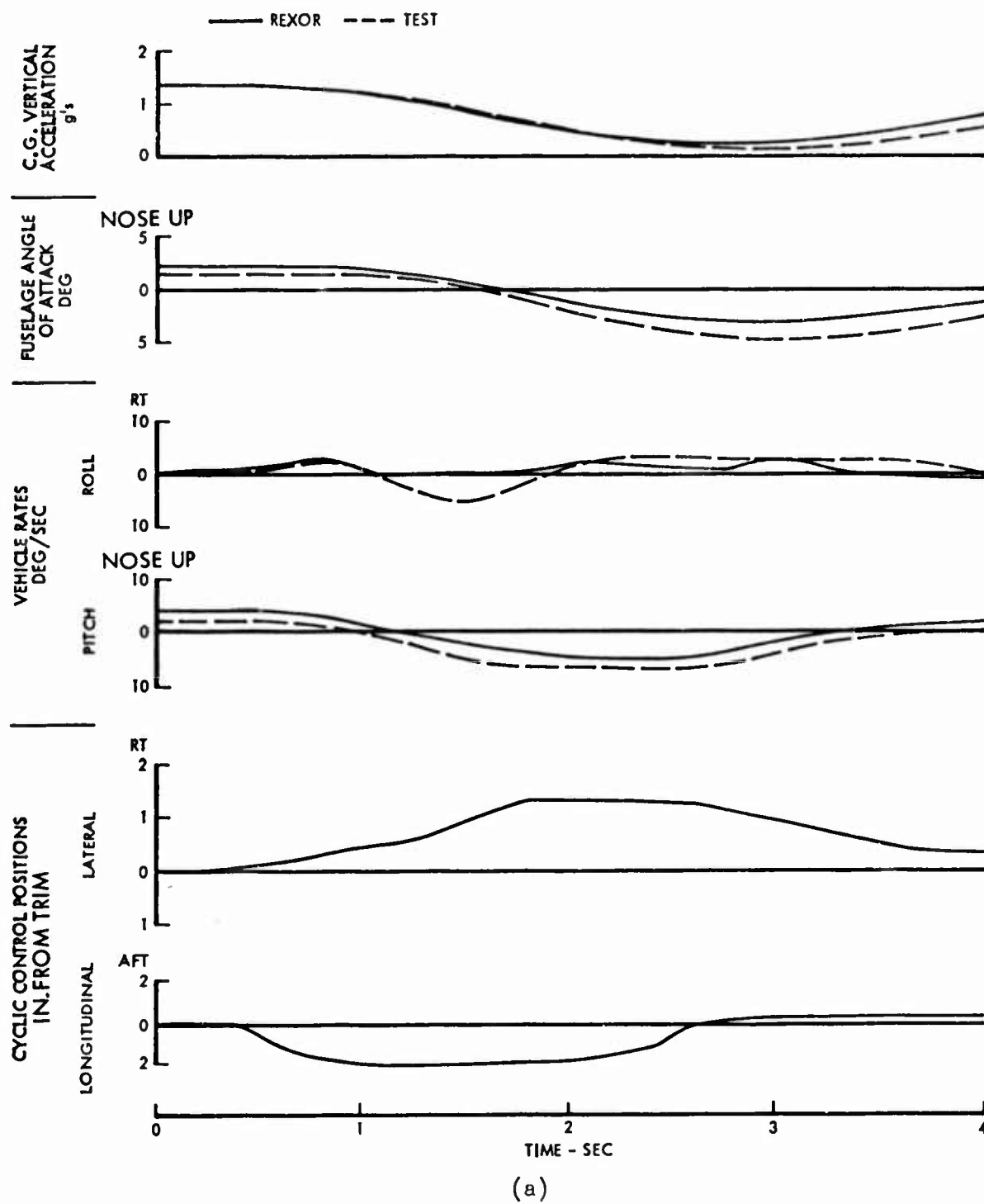
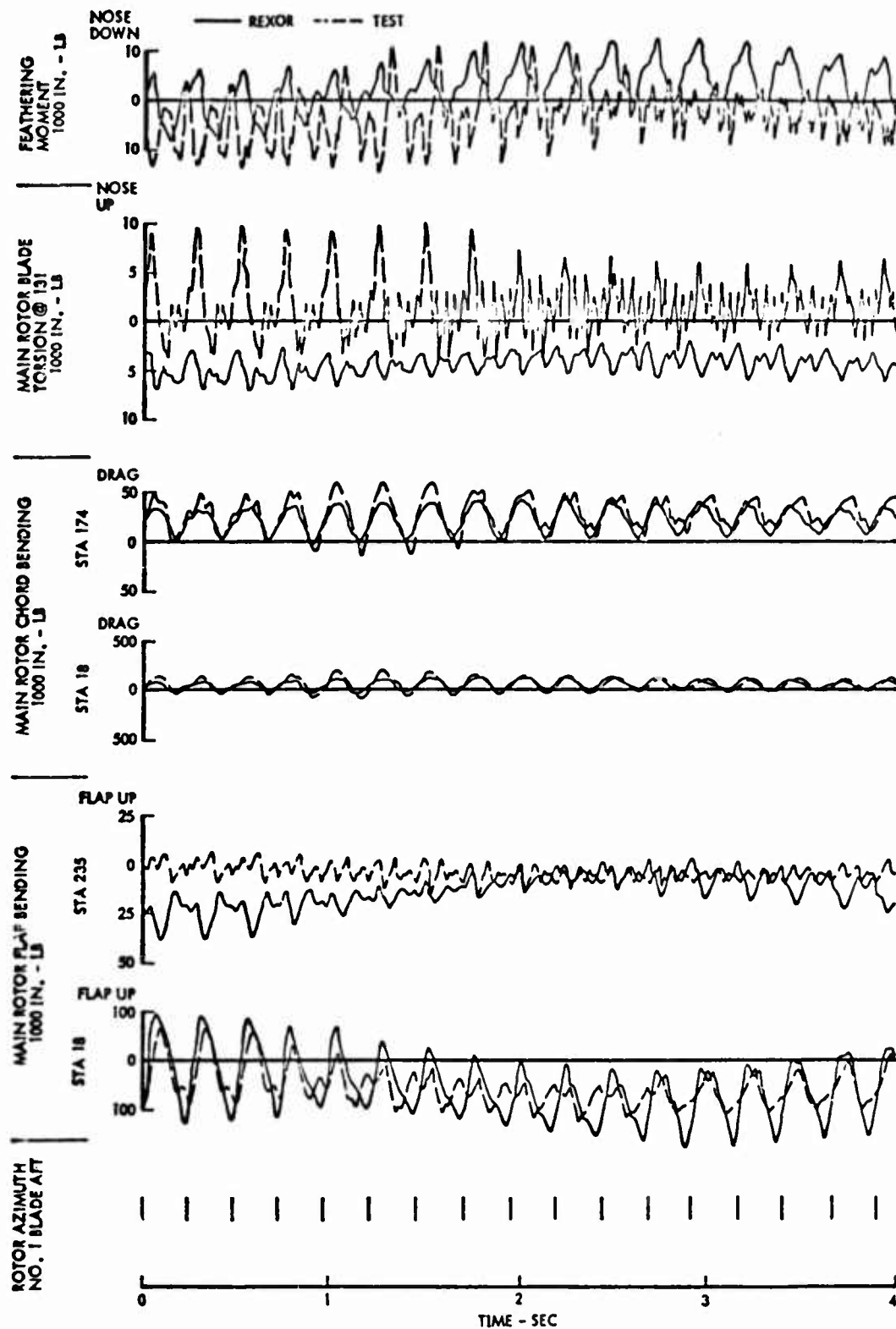


Figure 54. AH-56A Transient Maneuver, Pushover - Case 46.



(b)

Figure 54. Continued.

In some cases, test data was not available for certain parameters or data items. A note on the respective figure indicates that the test data was not available, or another parameter may be substituted in place of the nominal parameters previously described as being selected for correlation. For blade loads, an attempt was made to show correlation of data for loads near the rotor centerline and near the midspan of the blade. The correction previously discussed on the flap moment at station 18 due to the T-T pack was applied to the steady value of this moment in the time histories shown. However, no correction was applied to the oscillatory portion of the station 18 computed time histories, which means they are approximately 9 percent too high.

#### Correlation With Pullup Maneuvers

In Figures 47, 52 and 53, the three pullup maneuver conditions are shown. Figure 47 is a pullup to approximately 1.7 g at 114 KEAS; Figure 52 to approximately 1.9 g at 169 KEAS; and Figure 53 to 2 g at 180 KEAS. Referring to the (a) portion of these figures, it can be seen that fairly good duplication of the experimental flight conditions is impractical to achieve; it is to be expected that exact duplication of the corresponding rotor loads is not achieved. The (b) portions of these three figures show that excellent correlation of the REXOR computed root and midspan chordwise bending moments is achieved throughout each maneuver. Similarly, good correlation is seen with the station 18 flapwise bending moment. However, the midspan flapping moment correlation is only fair. Again this is due to the limitations imposed by inclusion of only three blade modes. The correlation on feathering moments and torsion moments is only fair at best; however, the predicted overall levels of torsion/feathering loads and their trends agree well with the measured data. It is apparent that poor 2P and higher harmonic torsion and feathering moment correlation is obtained, particularly at the load factor peaks, because dynamic stall was not accounted for in the correlation study.

In the 114 KEAS pullup in Figure 47, a roll rate oscillation occurred which was not present in the experimental time history. This resulted in the computed flap and chord moment rotor loads in some phase shifting and changing in amplitude relative to the test data. Where the predicted roll rate was in good agreement with the experimental data, as in Figures 52 and 53, excellent agreement is seen in these loads.

#### Correlation With Pushover Maneuvers

The three pushover maneuver correlation cases are shown in Figures 48, 51 and 54. Figure 48 presents a pushover maneuver at 123 KEAS to 0.25 g; Figure 51 at 176 KEAS to 0.5 g; and Figure 54 at 183 KEAS to 0.2 g. These maneuvers are roller-coaster type maneuvers in that they are not initialized from 1 g level flight, but from a positive load factor or pullup condition. Again, referring to the (a) portion of these three figures, it can be seen that there is fairly good agreement between the

REXOR time history of parameters defining the maneuvers and the test response. Some deviation in roll rate is seen in the low-speed case in Figure 48 and in the high-speed case in Figure 54. However, neither of these deviations is as sharp or rapid as for the pullup case in Figure 48; therefore, less effect should be seen on the flap and chord moments. A review of the (b) portion of Figures 48, 51 and 54 shows that the correlation of chord moments is excellent, flap moments is good and torsion and feathering moments is fair. The same influences as discussed previously on feathering moments and torsion moments still hold true.

In the pushover maneuver in Figure 48, it is seen that the LP station 18 flapping moment at the low load factor, negative angle-of-attack end of the maneuver, is more flap up over the tail than measured. The LP flapping moment at station 18 is directly proportional to the shaft moment required to balance the pitching moments coming from the body. This discrepancy in flapping moment would therefore be indicative of a more nose-down, aerodynamic pitching moment on the test vehicle body with negative angle of attack than that used in the analysis. Also, referring to Figure 52, the test shaft moment or LP station 18 flap moment gradient with increased load factor or positive angle of attack appears to be larger than the predicted level. This would tend to indicate that the effective aerodynamic center to center of gravity relationship on the test vehicle wing body was somewhat ahead of that used in the REXOR analysis. This could come from several sources, including definition of the wing body aerodynamic characteristics, main rotor to body inflow or aerodynamic interference effects, and main rotor-propeller inflow considerations and associated flow and loading effects on the horizontal tail.

With this consideration in mind, overall good agreement is obtained in these transient pushover maneuvers between REXOR and flight data on both chord and flap moments. The predicted torsion and feathering moments show similar trends to the test data and are in agreement on general levels of loads.

#### Correlation With Rolling Transient Maneuvers

Two cases were selected for correlation of transient rolling maneuvers. The correlation data for these two cases is shown in the form of time histories in Figures 49 and 50. Figure 49 shows a right rolling maneuver to 25 degrees per second at an airspeed of 161 KEAS, and Figure 50 shows a left rolling maneuver to 25 degrees per second at 122 KEAS. Both of these maneuvers were conducted from 1 g level flight condition.

Again, referring to the (a) portion of these two figures it can be seen that good duplication of each of these two flight conditions is achieved by the computed time histories. Also, a review of the (b) portion of the figures for these two rolling maneuvers shows that correspondingly excellent correlation is achieved for the chordwise bending moments.



The correlation obtained on the flapping moments, particularly flap at station 18, is good to excellent. The flapping moment correlation for the left rolling maneuver is very good. The higher speed right rolling maneuver, however, shows a higher level of 3P flapping than measured.

Fairly good agreement in the fundamental oscillatory behavior of both the torsion and feathering moments computed by REXOR and those measured in test has been achieved. The predicted amplitudes and phases of the predominant frequency (1P) response in these moments are in very good agreement. As would be expected, due to the restricted number of modes used in the analysis, the test data shows lower amplitude, higher frequency responses which are not duplicated by the REXOR time histories.

#### XH-51A STEADY-STATE CORRELATION RESULTS

Four XH-51A cases were selected for correlation with the REXOR program. These cases include four steady load factors ranging from 1.03 g to 1.69 g, all at an airspeed of 170 KEAS and at a collective setting of 3 degrees measured at the blade root. The results of these studies are presented in Figures 55 through 63.

Figures 55 and 56 show the harmonics of hub and blade flapwise moments as a function of load factor at rotor stations 6 and 115. Figures 57 and 58 present the chord moments for these conditions at stations 5 and 45, and Figure 59 presents the harmonics of feathering moment. Figure 60 presents a comparison of the corresponding trim angles for each of these load conditions. In addition to the harmonic data vs load factor, harmonics of flapping and chord moments as a function of rotor station are given in Figures 61, 62, and 63.

In general, a review of these data shows that much of the same discussion as on the AH-56A steady-state correlation is applicable here. The predicted chord moments and 1P flapping moments show good agreement with measured data. The feathering moment exhibits much the same characteristics as on the AH-56A, and the degree of correlation is similar.

One item made evident by the study, which has primary effect on the blade and hub steady flapping moments, is an apparent shortcoming in REXOR in the accounting of the energy contribution of the centrifugal loads into the blade mode generalized forces. The rotor blade on the XH-51A is sheared forward so that the 1/4 chord at the blade attachment to the cuff (station 27.85) is approximately 10 percent of the chord forward of the feathering axis. In the REXOR program, the centrifugal loads and the work done by these loads are treated independently in that they are not incorporated as equivalent generalized stiffness in the several blade modes. This was done to permit the time variation of the structural principal axes on the blade relative to the centrifugal force field and thus enhance its capability in dynamic stability computations by inclusion of these periodic effects.

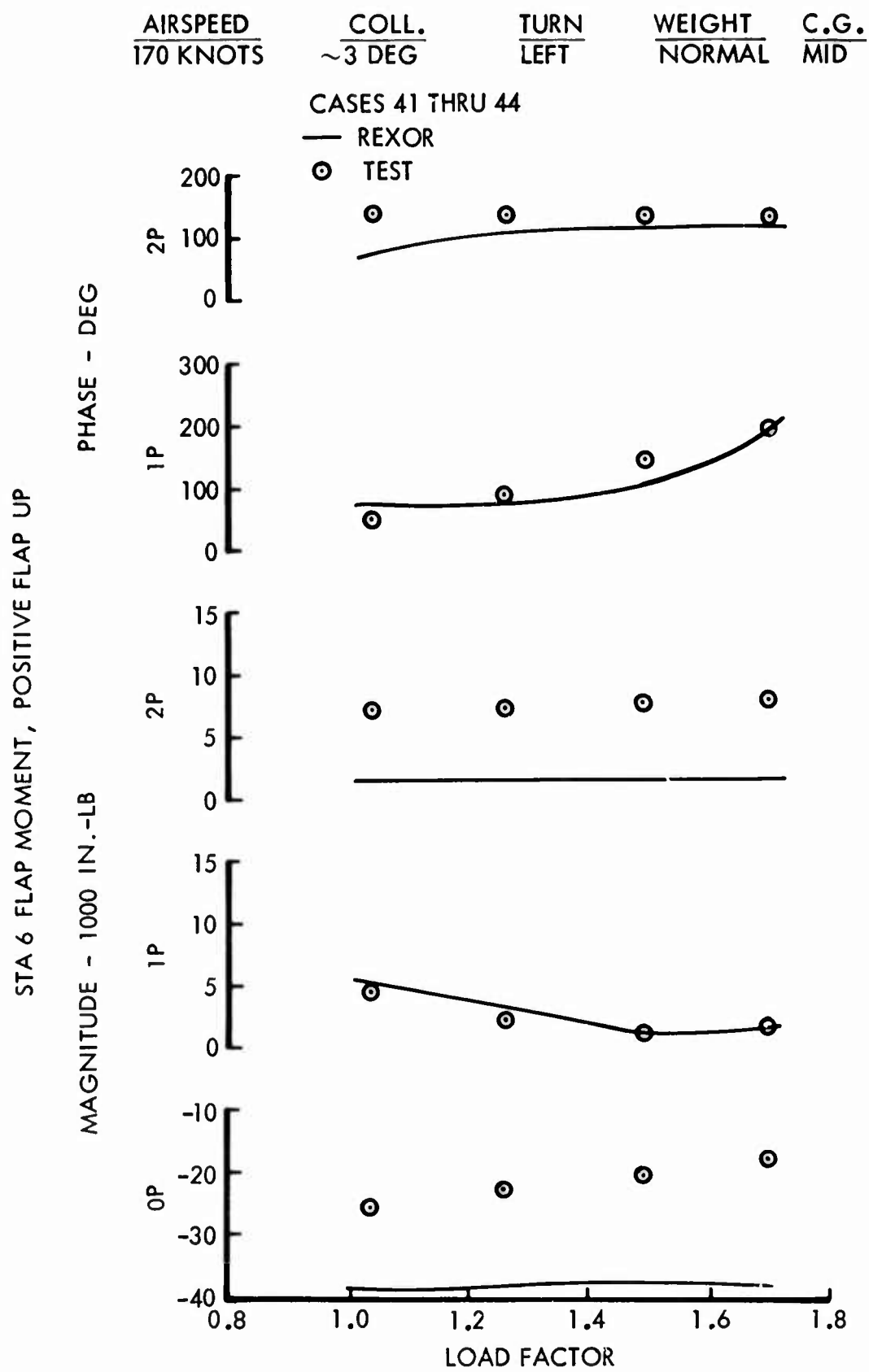


Figure 55. XH-51A Sta 6 Flap Moment vs. Load Factor.

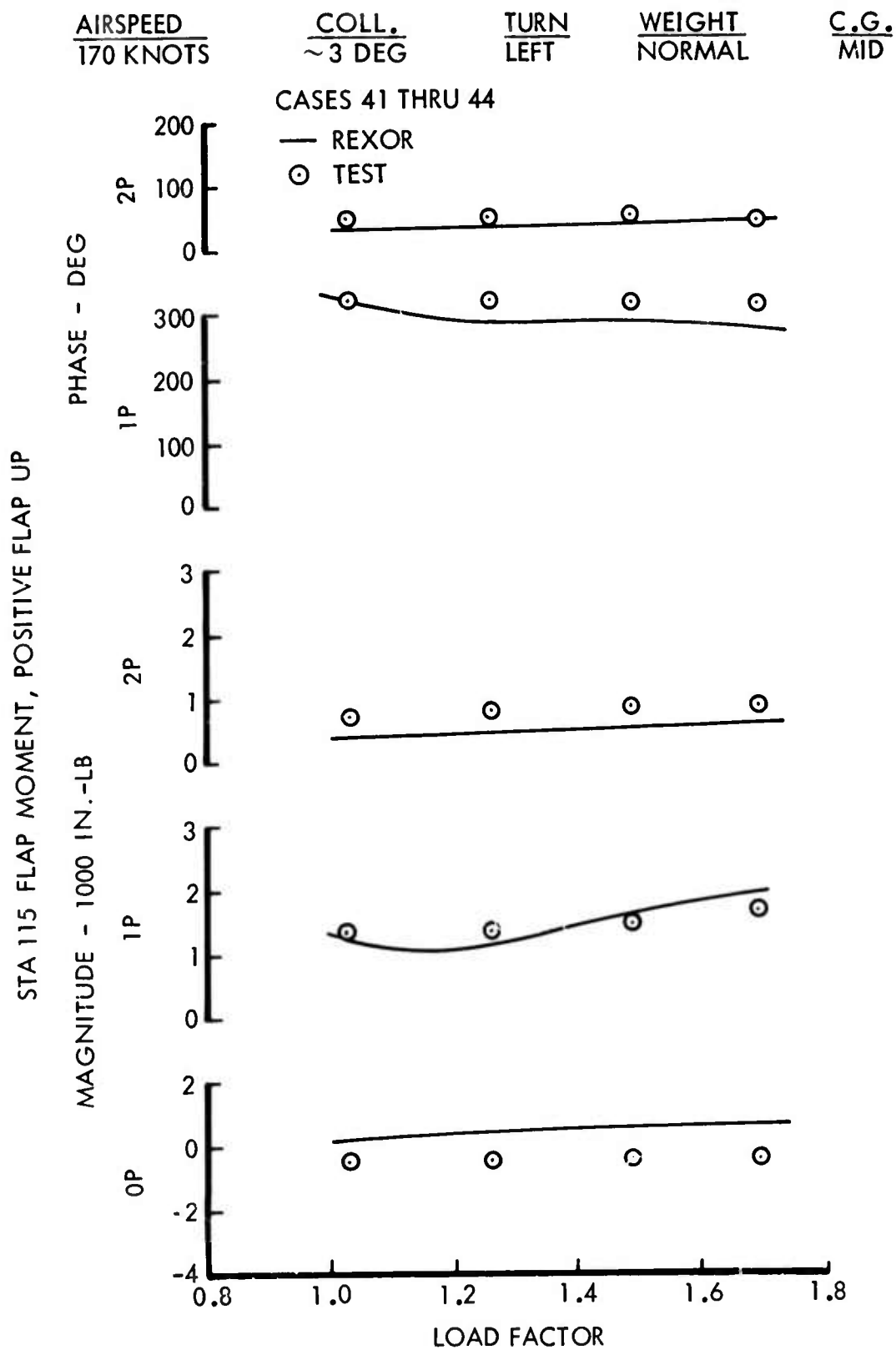


Figure 56. XH-51A Sta 115 Flap Moment vs. Load Factor.

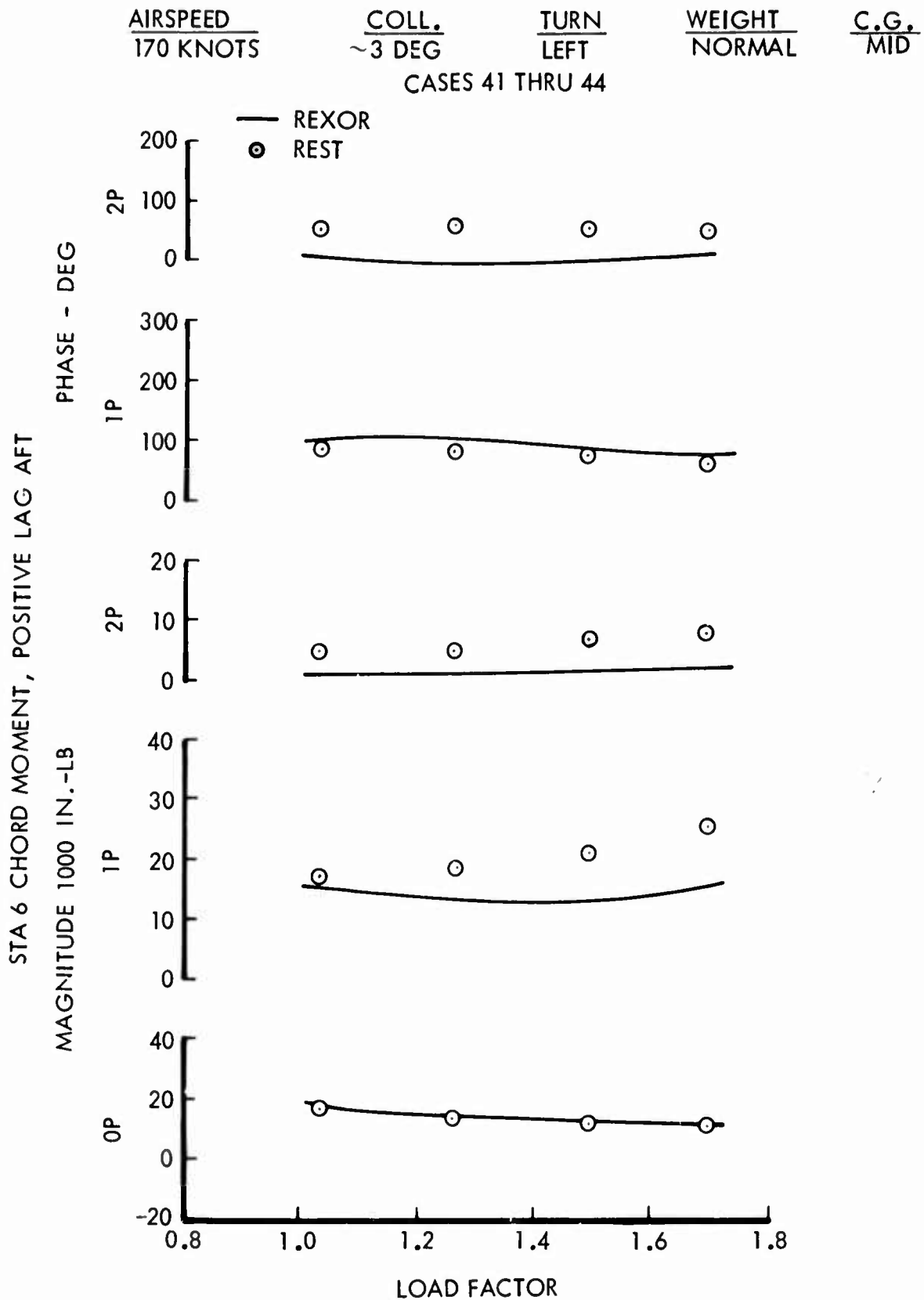


Figure 57. XH-51A Sta 6 Chord Moment vs. Load Factor.

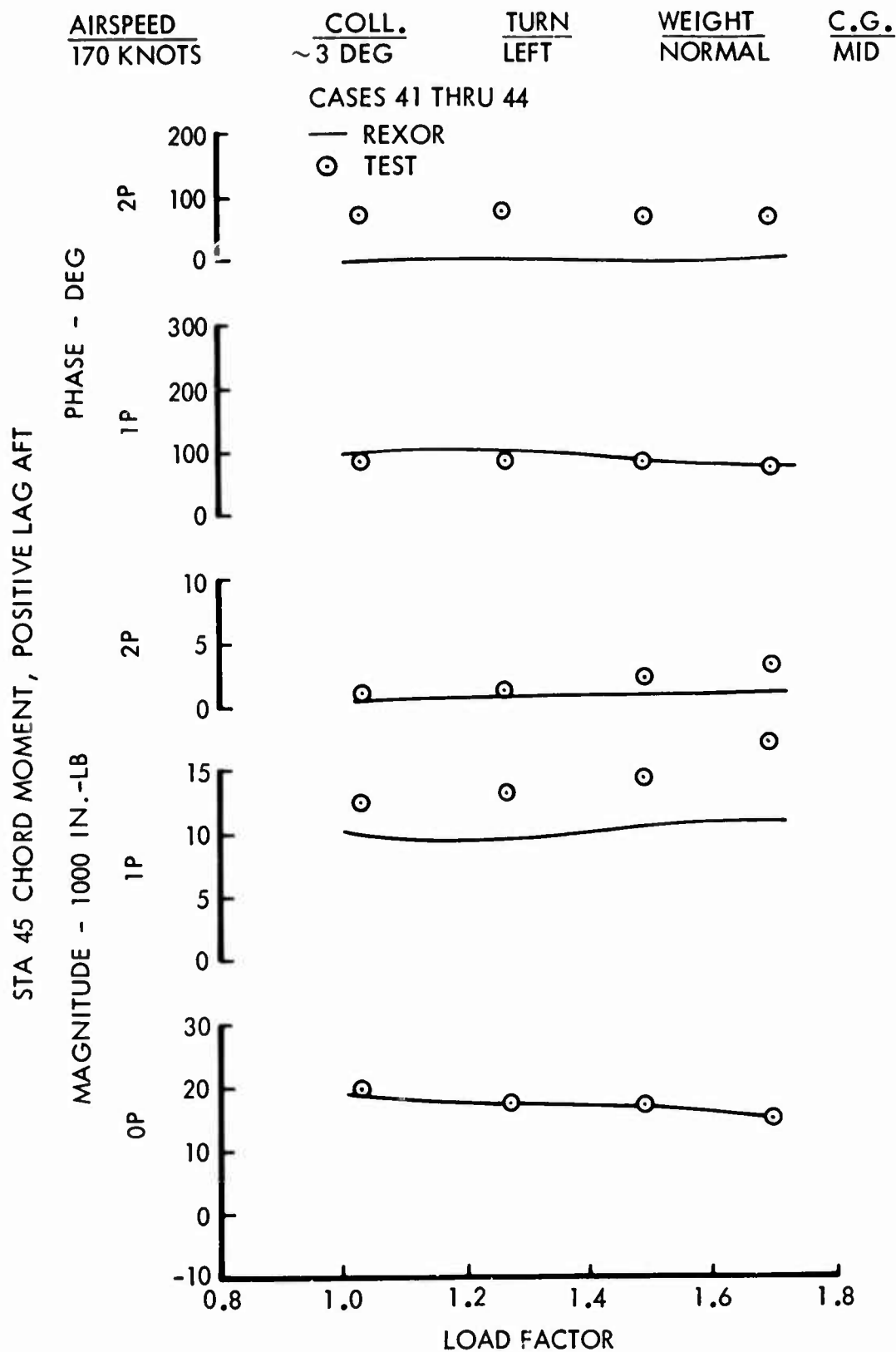


Figure 58. XH-51A Sta 45 Chord Moment vs. Load Factor.

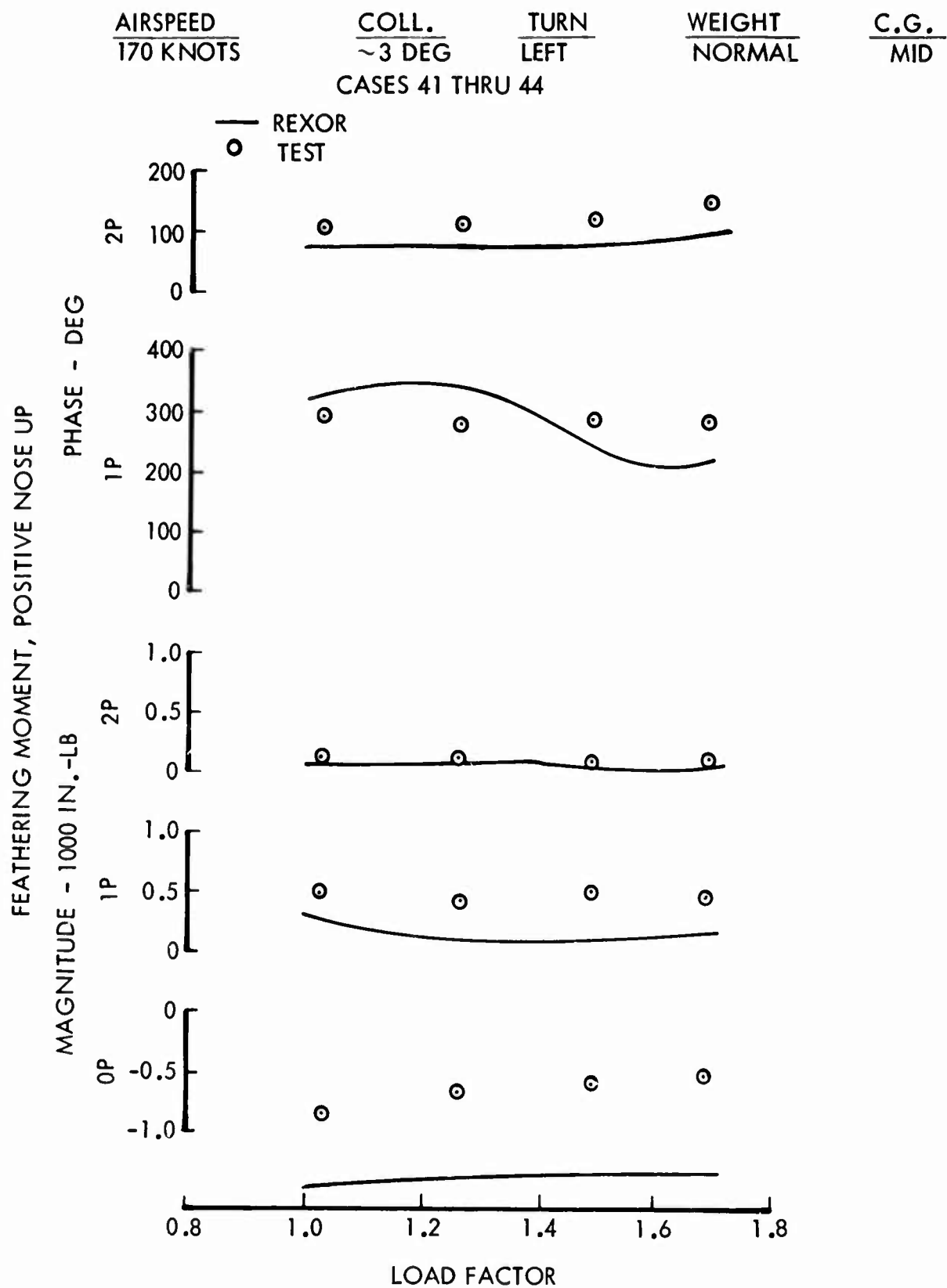


Figure 59. XH-51A Feathering Moment vs. Load Factor.

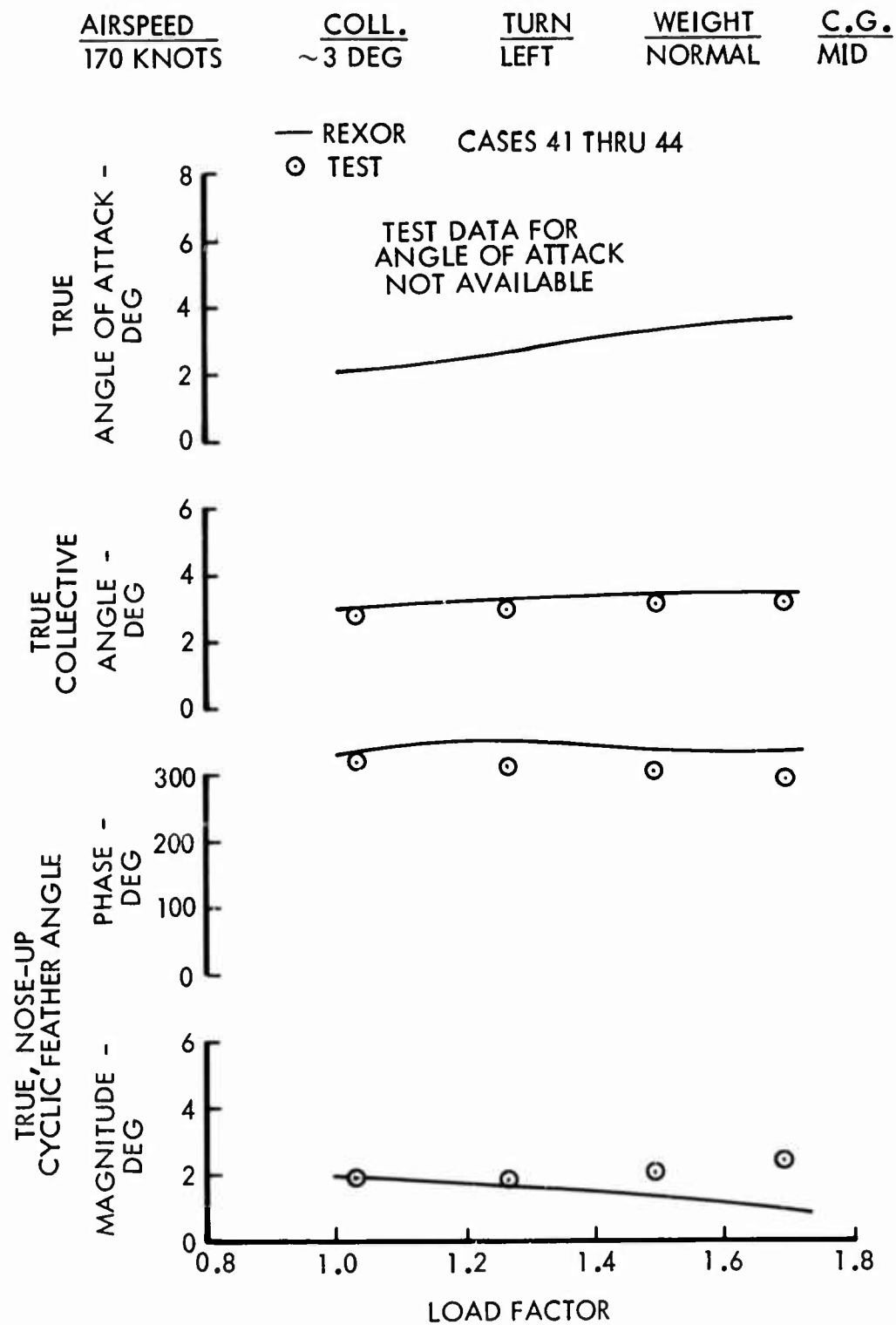
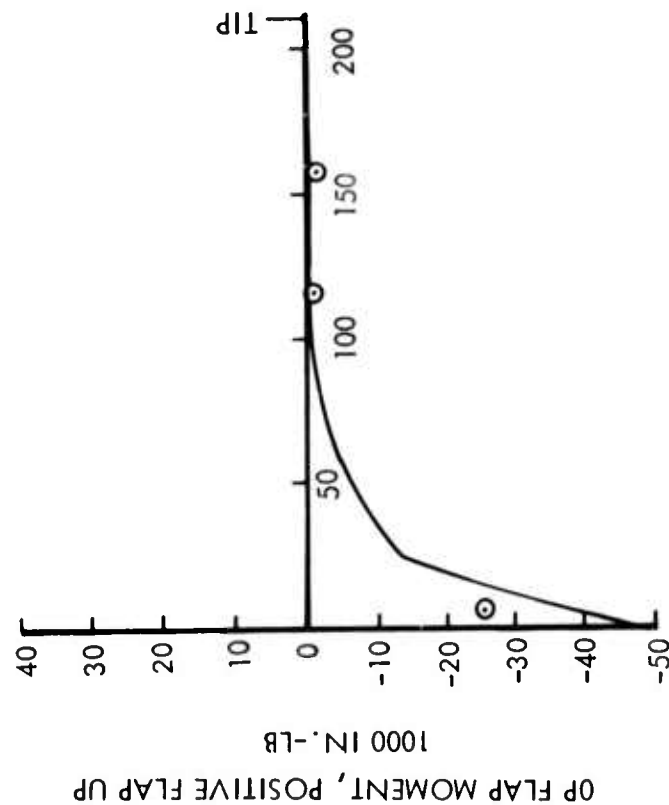


Figure 60. XH-51A Main Rotor Trim Angles vs. Load Factor.

CASE 41

### FLAP MOMENT



### CHORD MOMENT

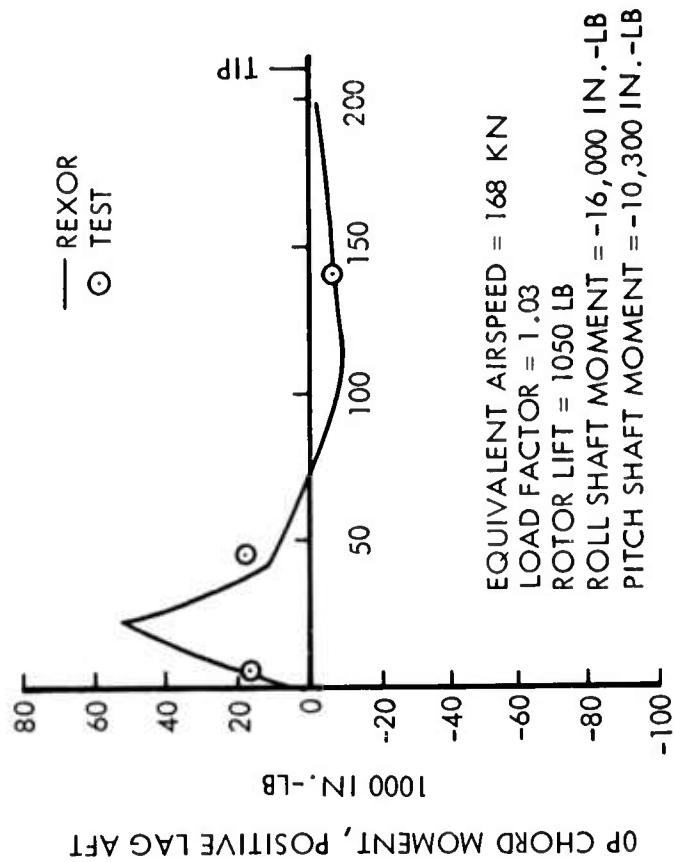


Figure 61. XH-51A OP Flap and Chord Moment vs. Blade Station.



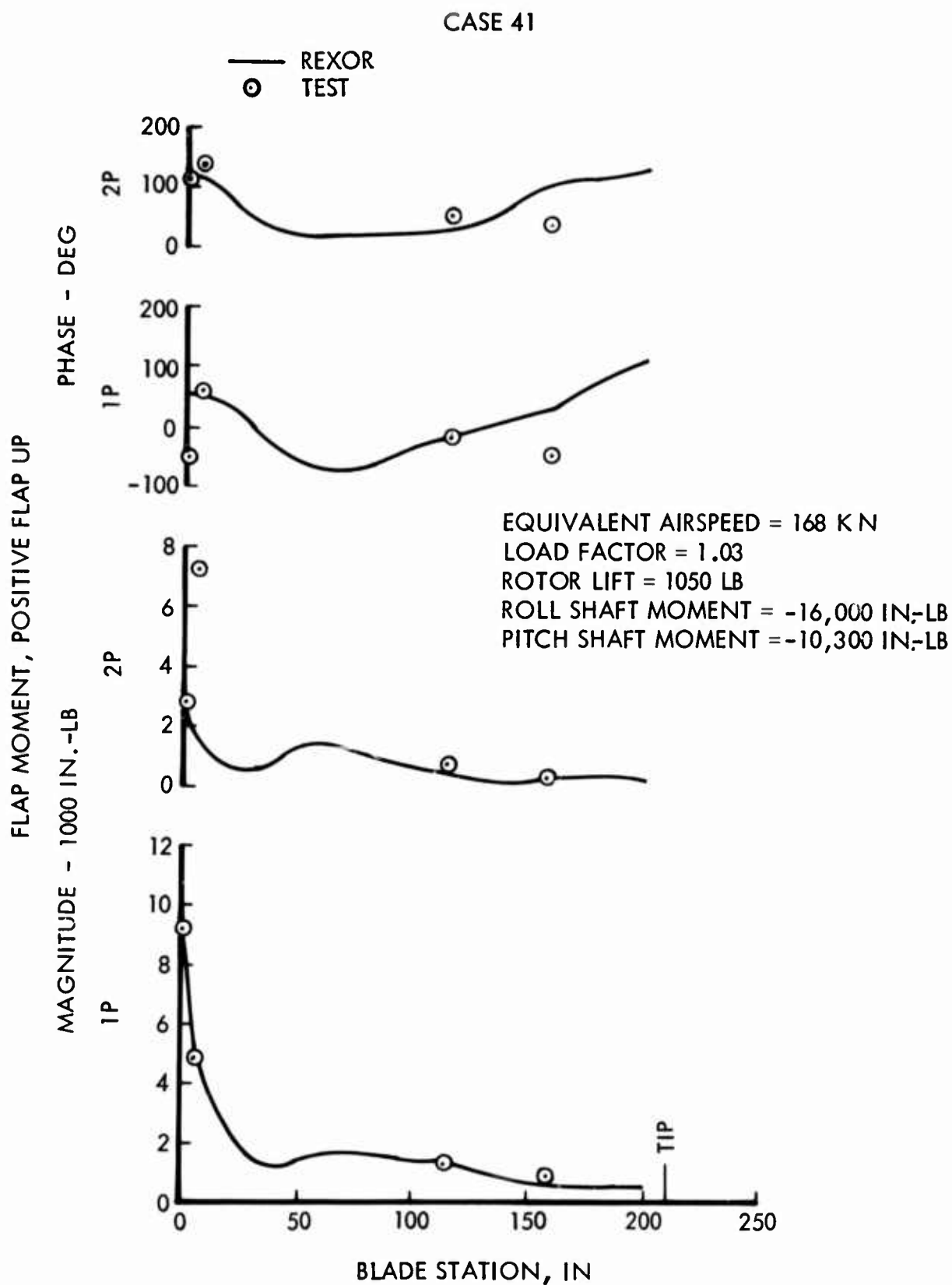


Figure 62. XH-51A 1P and 2P Flap Moment vs. Blade Station.

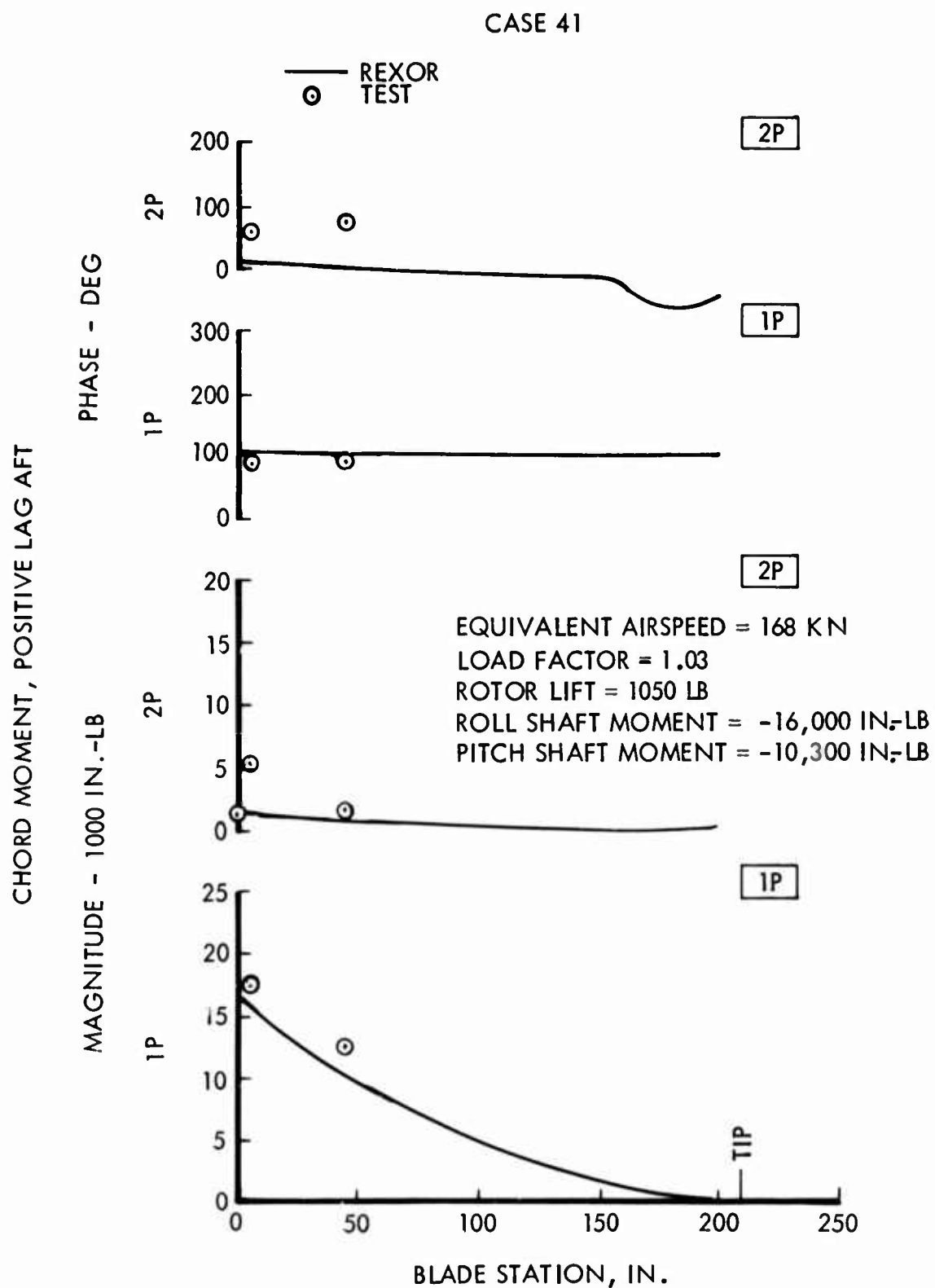


Figure 63. XH-51A 1P and 2P Chord Moment vs. Blade Station.

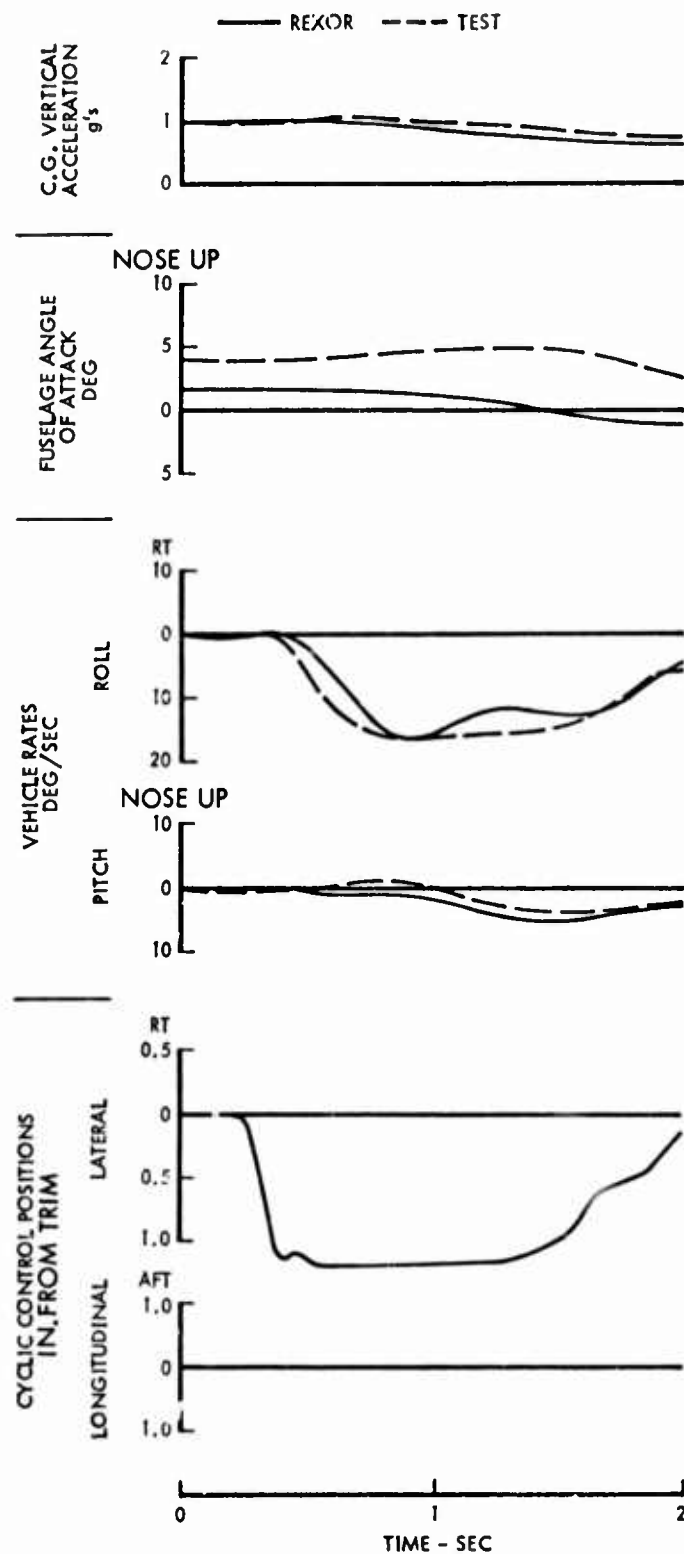
The shortcoming in the analysis was in the computation of the energy contribution due to the centrifugal loads. This computation requires computing the spanwise or radial motion of each blade element. The computation for this is based on the computed span motion of a reference line with a transformation then being made to the center of gravity. This reference line was originally selected as the quarter-chord which is an improper choice. The reference line should be the neutral axis of the blade. This improper choice of axes results in errors in the work done by the centrifugal force in the various modes, particularly in a system as in the XH-51A blade description where large differences can exist between the neutral axis, one-quarter chord and blade center of gravity. The correction to the program is relatively simple but was not incorporated in this correlation effort since the contract called for taking the existing REXOR program and performing the correlation. The result of this correction, however, would provide a much better determination of the steady deformed shape of the blade. Differences in the steady shape of the blade, particularly in flapping, have been noted between REXOR and the Rotor Blade Loads program which are not totally attributable to the restrictions imposed by three blade modes. This improved representation should resolve these differences to a large degree and therefore enhance the prediction of steady flapping moments by the REXOR program.

#### XH-51A TRANSIENT MANEUVERING CORRELATION RESULTS

Four XH-51A transient maneuvering cases were also selected for correlation. The cases included a left rolling maneuver at 129 KEAS, a right rolling maneuver at 161 KEAS, and pullups at 139 and 162.5 KEAS. Correlation data for each of these cases are presented in Figures 64, 65, 66, and 67 respectively. The data presented is similar to that presented for the AH-56A transient maneuvers. That is, the (a) portion of each figure shows maneuver condition data, and the (b) portion of each figure presents time histories of predicted and measured blade loads. Flapping moment at station 6 was not measured during any of the experimental transient maneuvers.

Referring to the (a) portion of Figures 64 and 65, good duplication of the left and right rolling maneuvers is achieved. The predicted angle of attack in each case, however, is on an average approximately 3 degrees lower than measured. It is not clear whether this is a real difference or an error in the measured data. The (b) portion of these two figures shows that very good correlation is obtained in the levels of the fundamental responses of each of the loads compared.

It is interesting to note the predicted chord moment at station 6, for the right rolling maneuver shows very good agreement up to the peak load measured during the maneuver and then remains at a higher level than that



(a)

Figure 64. XH-51A Transient Maneuver, Left Roll - Case 53.

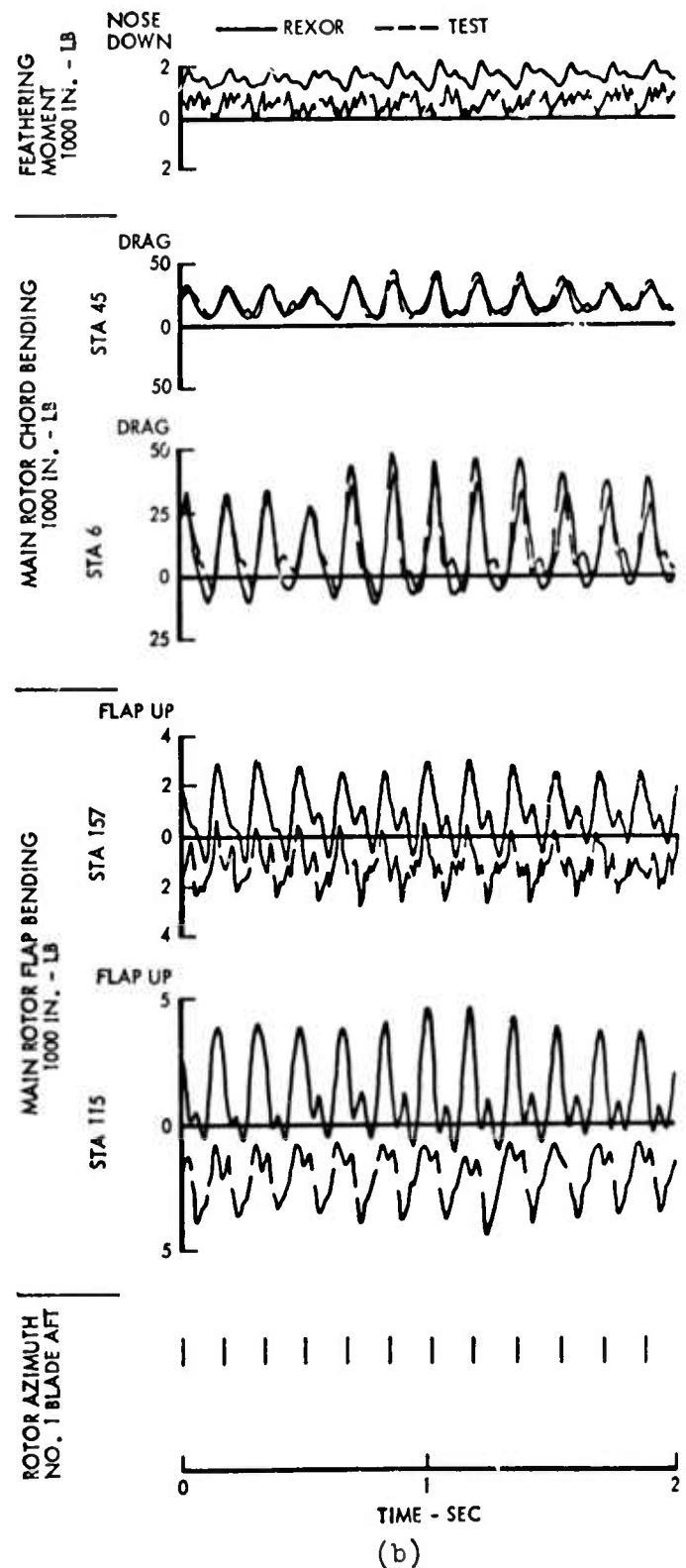
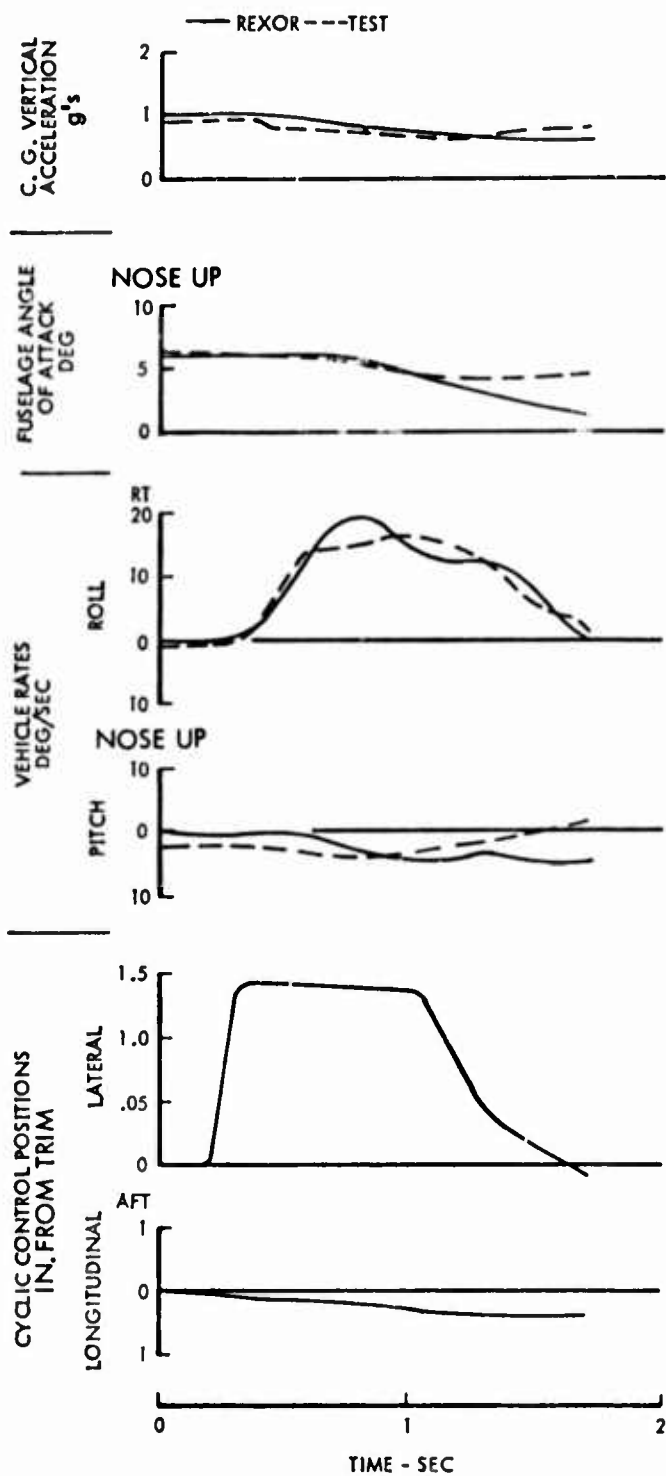
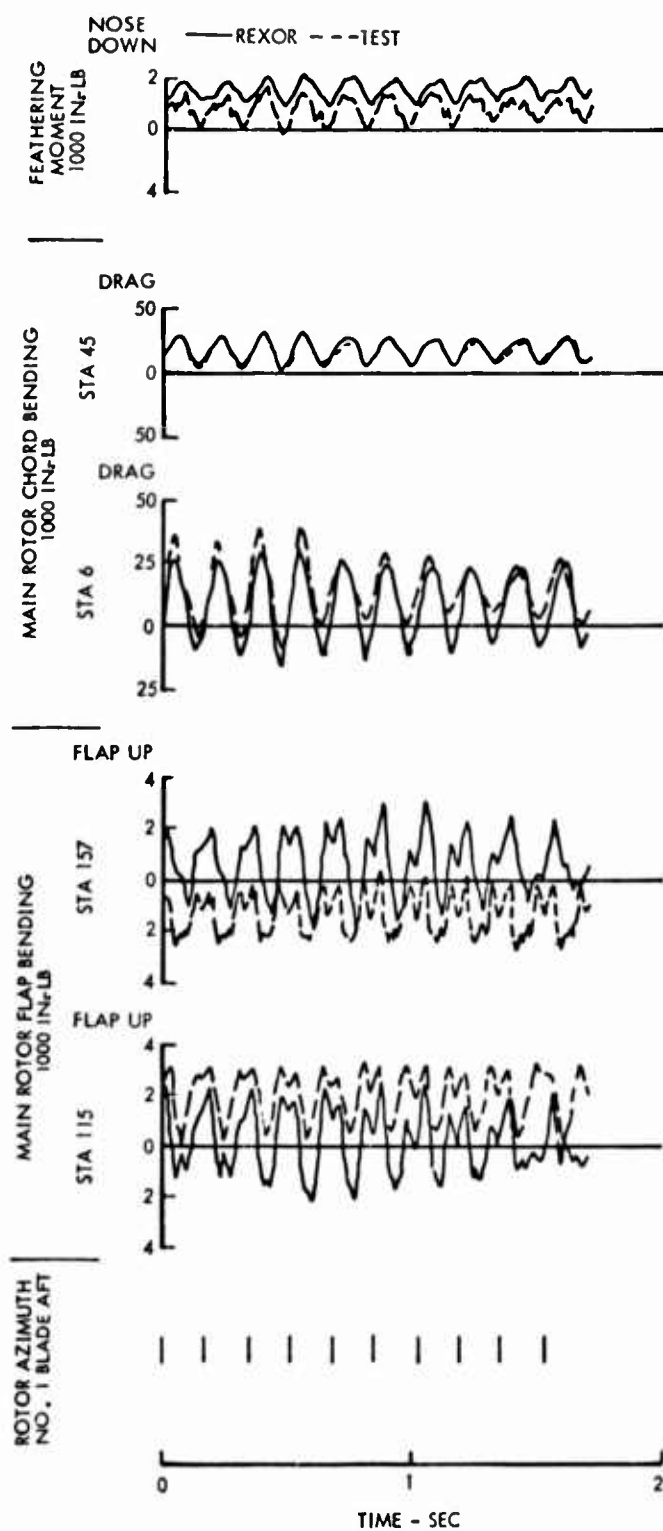


Figure 64. Continued.



(a)

Figure 65. XH-51A Transient Maneuver, Right Roll ~ Case 54.



(b)

Figure 65. Continued.

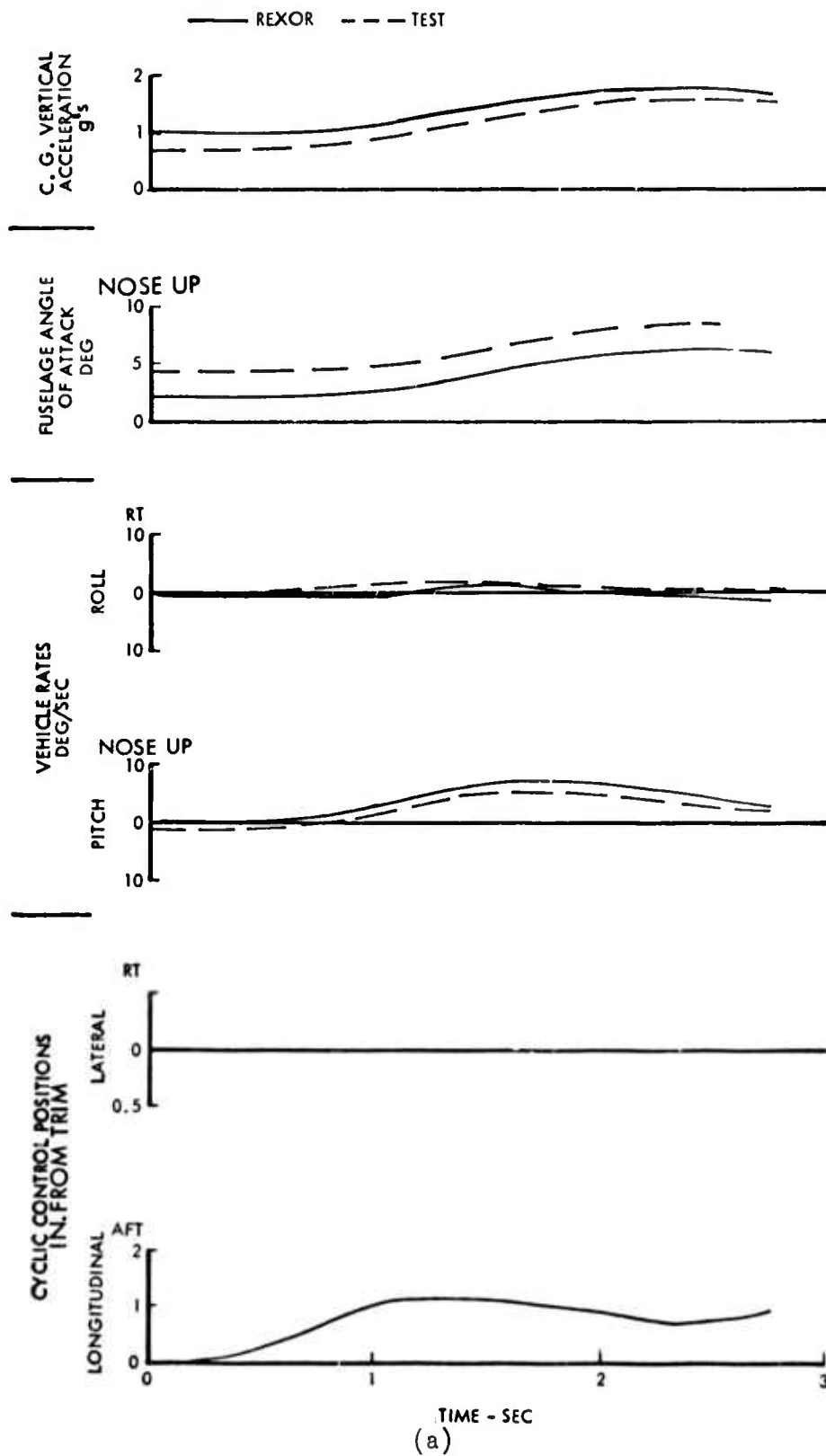
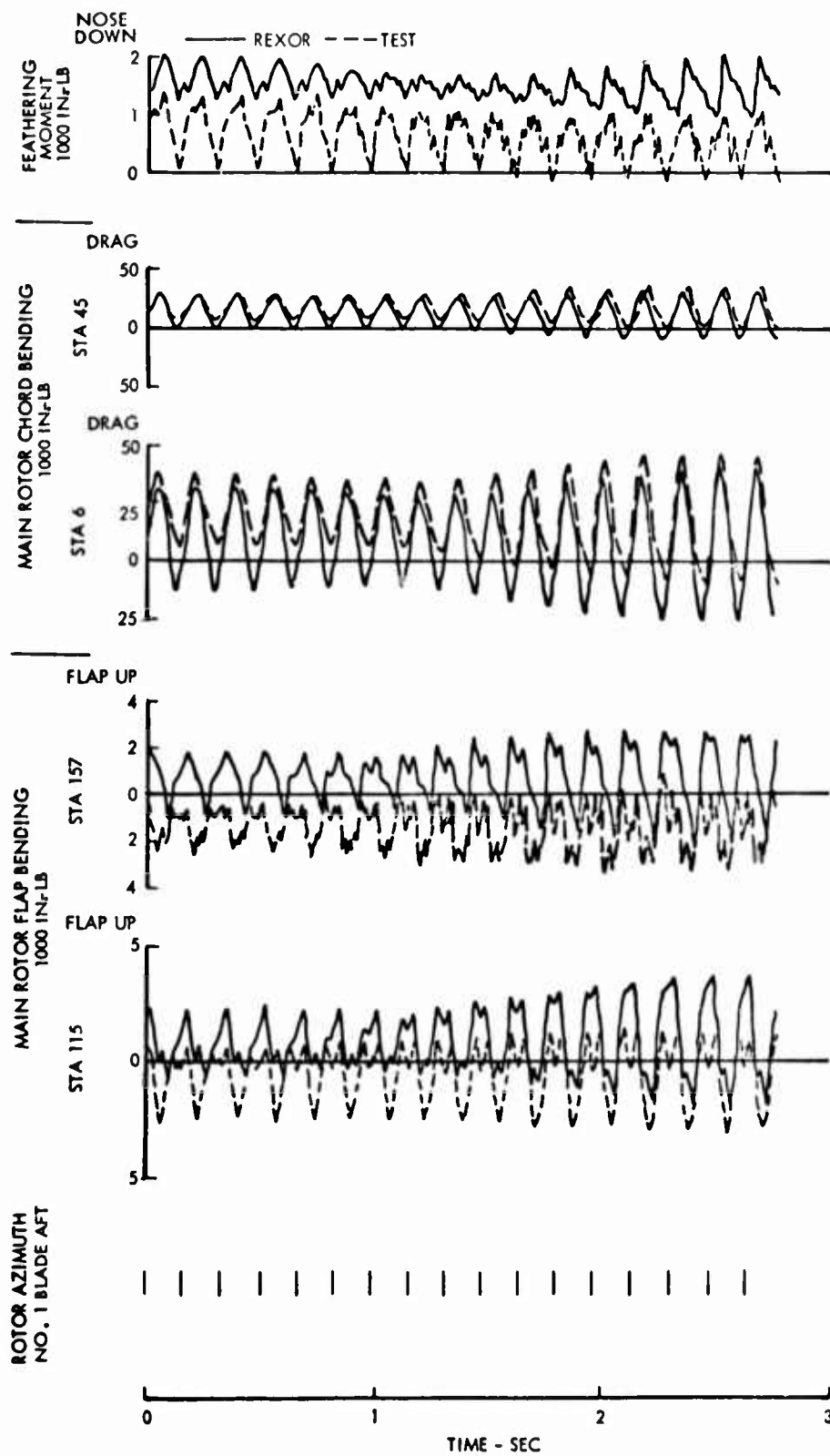


Figure 66. XH-51A Transient Maneuver, Pullup ~ Case 55.





(b)

Figure 66. Continued.

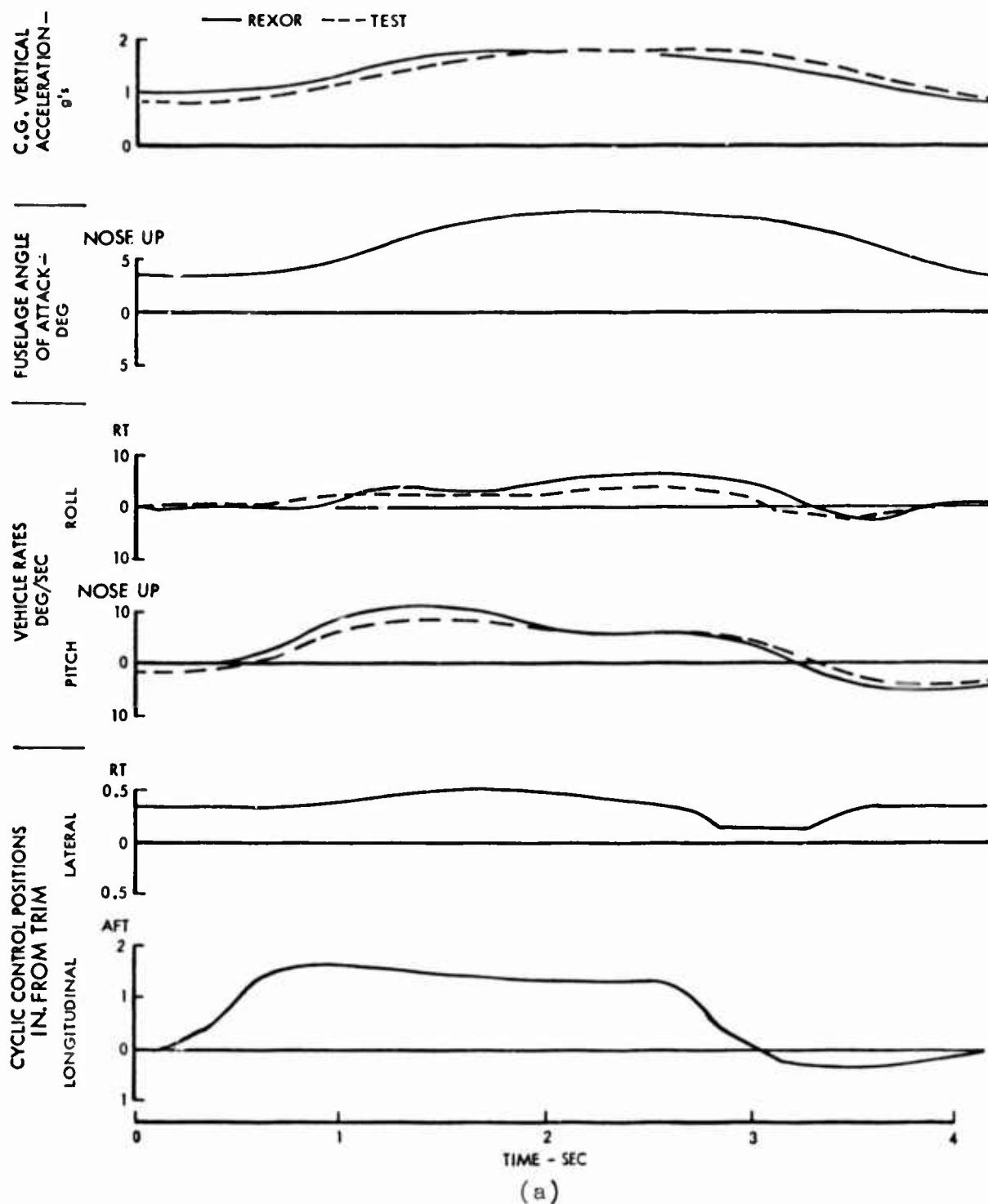
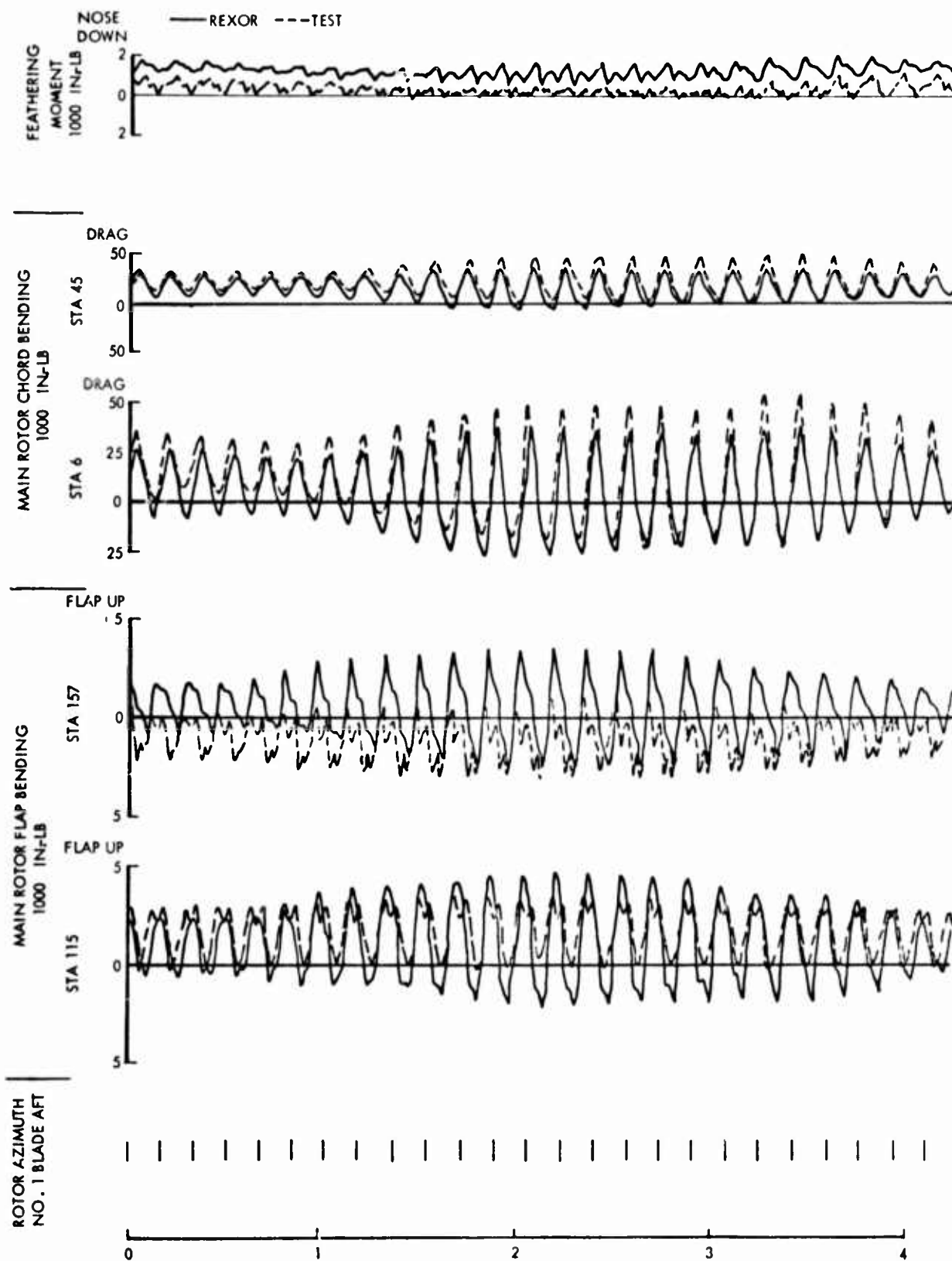


Figure 67. XH-51A Transient Maneuver, Pullup ~ Case 56.



(b)

Figure 67. Continued.

measured during the time history. The predicted chordwise bending at station 45, however, shows nearly precise duplication of the experimental result. The left rolling maneuver exhibits a similar characteristic with a less pronounced difference in the station 6 chordwise moment.

The two XH-51A pullup maneuvers are shown in Figures 66 and 67. The pilot technique for making pullup maneuvers in the XH-51A test program was to initiate the maneuver from a mild pushover. The REXOR analysis does not currently include trim capability in pushover maneuvers, so the load factors variation shows the same trends as the test data, but is not identical. As in the case of the AH-56A, correlation of chord loads is excellent and the correlation of flap loads is fair. The feathering-moment correlation is better than that on the AH-56A.

## CONCLUSIONS

The results of the correlation effort between REXOR and AH-56A and XH-51A flight data lead to the following conclusions:

- The REXOR analysis, which has been developed as an interdisciplinary method for predicting performance, dynamic stability, and handling qualities, can also be successfully applied to predict steady-state and transient maneuver rotor loads and corresponding flight envelope limits.
- The REXOR analysis, as applied for predicting both steady-state and transient rotor loads, accounts for the full coupling of individual rotor blades to each other through the hub and control system dynamics to the fuselage.
- The study has demonstrated the capability of REXOR to simulate any specific actual flight condition, thus permitting prediction of blade loads for these conditions.
- The study has demonstrated the flexibility of the REXOR analysis in application to different helicopter configurations. In this report, successful application of the analysis has been carried out for two helicopters - the AH-56A and the XH-51A.
- Results of the investigation showed excellent agreement between REXOR and flight test data for blade chordwise loads in both steady-state and transient maneuver flight. Within the limitations imposed by including only two flap bending modes, good correlation was achieved between predicted and measured flapwise bending moments.
- The feathering moment at one blade root and outboard blade torsion loads gave only fair agreement in steady-state and AH-56A transient maneuver cases. The reason for the discrepancy is discussed within the text and is partially due to difficulties in determining the proper blade trim tab setting for the analysis.
- The correlation studies revealed that the accuracy of prediction with the REXOR analysis was strongly dependent upon precise definition of the relative locations of the blade feathering axis, center of gravity axis, neutral axis, elastic axis, and hub and blade reference axes.

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## APPENDIX I

### FLIGHT TEST DATA

The harmonic components of the blade loads and related parameters from trimmed flight conditions are presented in tabular form in this appendix. Forty AH-56A cases and four XH-51A cases are included as shown in Table I.

The harmonic components are defined from the equation:

$$Y = AO + \sum_{J=1}^N AD \cos JX + \sum_{J=1}^N BJ \sin JX$$

or in complex notation

$$Y = AO + \sum_{J=1}^N CJ \cos (JX - \psi_{IJC})$$

where  $Y = Y(t)$  is the time history being harmonically analyzed. The other symbols and abbreviations used above and in the tables are defined as:

|        |  |
|--------|--|
| T      | Test Number  |
| CTR    | Counter number   |
| FLT    | Flight number  |
| TR     | Oscillograph trace number  |
| AO     | Mean or zero harmonic  |
| AJ     | Cosine component of the J'th harmonic. In the tables the first number in the column is AO. |
| BJ     | Sine component of the J'th harmonic  |
| CJ     | Magnitude of the J'th harmonic   |
| CJ MAX | CJ component having the largest value  |



|       |   |
|-------|---|
| JX    | Azimuth of the J'th component                     |
| PHIJC | Phase Angle                                       |
| PSIJC | Equals PHIJC/J, the azimuth for the first maximum |

The tabulated frequencies are in Hertz (cycles per second) and the phase angles are in degrees where the blade in the aft position is defined as zero azimuth. The units for other variables and their positive directions are:

Flap moments, flap up, in.-lb

Inplane moments, drag aft, in.-lb

Torsion, nose up, in.-lb

Pitch link axial load, tension, lb

Main rotor blade feather angle, nose up, deg

The pitch link loads were converted to feather moments for discussion and presentation in the body of the report. They were obtained from the pitch link loads tabulated in this appendix by multiplying the load by an effective arm using the relationships defined in Figures 68 and 69. Tension in the pitch link corresponds to a nose-down feathering moment. A static weight tare correction of 1,600 in.-lb should be subtracted from the feathering moments derived from the data in this appendix. The data presented for the flap bending measurements include a static tare correction.

The feather-angle phase presented, lags the true value by 30 degrees because of the frequency response considerations previously discussed. The phase angles for all other parameters are correct as presented.

The harmonic analysis was conducted over two rotor revolutions in every case.

The rotating measurements with one exception were taken from blade No. 1. The one exception was the XH-51A fixed hub flap bending at station 6 which was taken from blade No. 2. The No. 2 blade passes the blade reference position one-quarter of a revolution or 90 degrees after the No. 1 blade. A correction of 90 degrees should be applied to these data to obtain an equivalent No. 1 blade load.

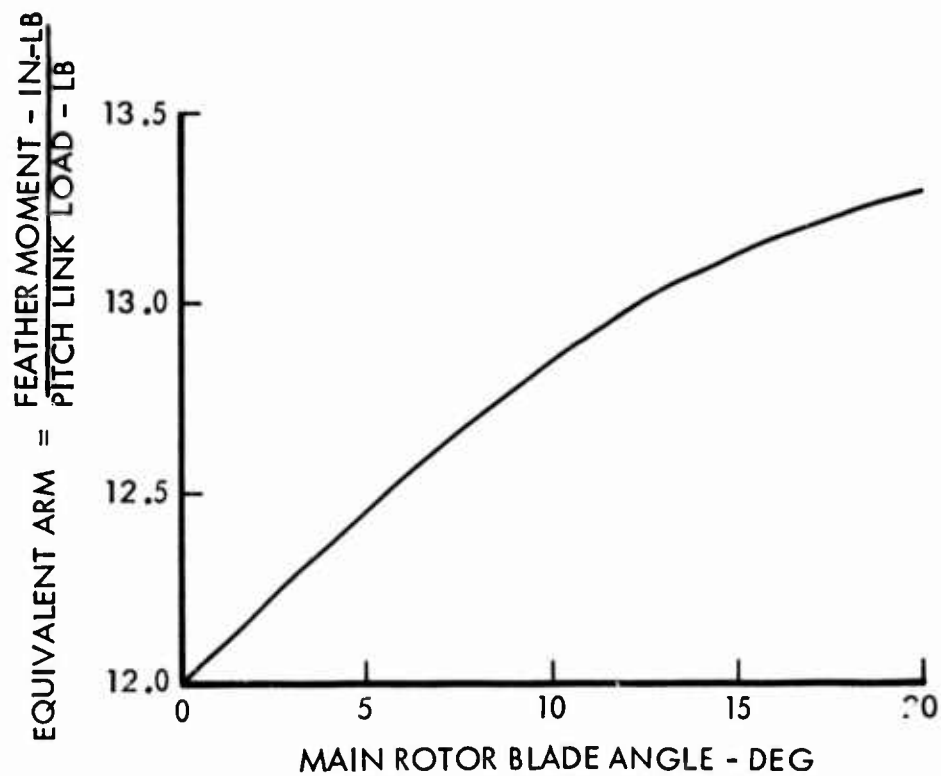


Figure 68. Conversion Factor, Pitch Link Load to Feather Moment, AH-56A ICS Phase III Blade.

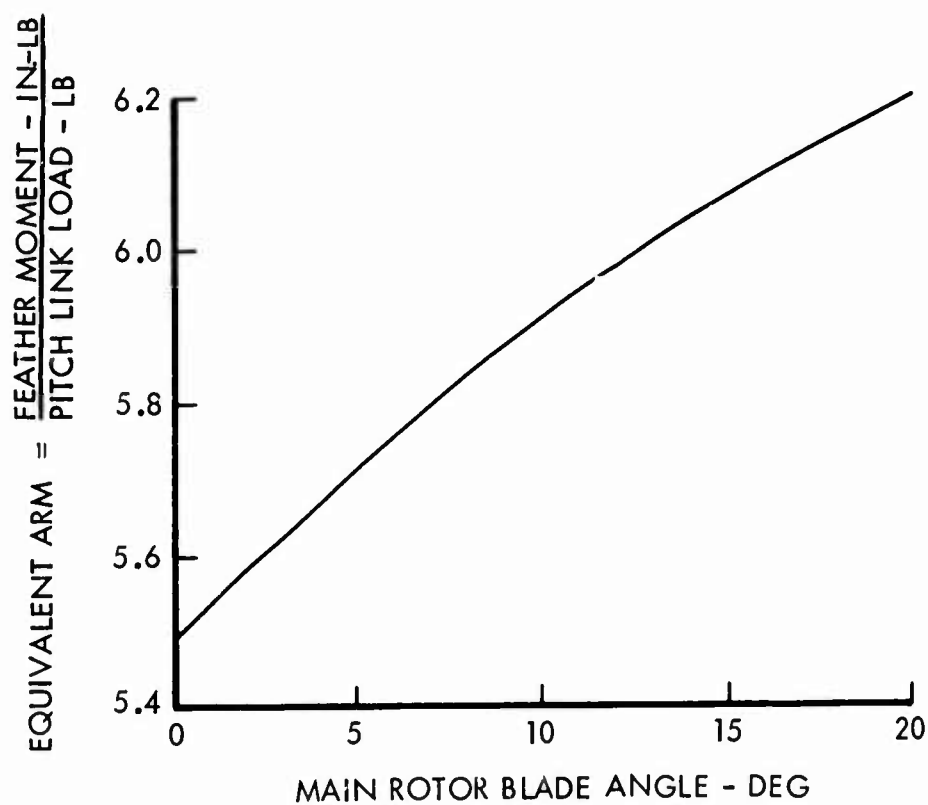


Figure 69. Conversion Factor, Pitch Link Load to Feather Moment, XH-51A Compound.

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 1 V= 154 KTS n= 1 g

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BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 406 CTR 230 FLT 503.0 TR 31

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.5551811E 01  |                |               |         |         |          | 1  | 4.098     |
| 0.3034293E 01  | -0.2344831E 01 | 0.3835200E 01 | 322.309 | 322.309 | 1.000000 | 2  | 8.197     |
| -0.1401471E 00 | -0.1524124E 00 | 0.2070527E 00 | 227.401 | 113.700 | 0.053987 | 3  | 12.295    |
| -0.2147982E-01 | -0.5902130E-02 | 0.2227594E-01 | 195.364 | 65.121  | 0.005808 | 4  | 16.393    |
| -0.4977015E-01 | -0.1043020E 00 | 0.1472644E 00 | 227.369 | 56.847  | 0.038398 | 5  | 20.492    |
| 0.1613834E-01  | 0.4434107E-01  | 0.4551239E-01 | 69.136  | 13.827  | 0.011615 | 6  | 24.590    |
| 0.4989411E-02  | 0.8544884E-03  | 0.5013041E-02 | 7.565   | 1.201   | 0.001307 | 7  | 28.689    |
| -0.3175351E-01 | -0.8547374E-02 | 0.3287081E-01 | 145.150 | 27.879  | 0.008578 | 8  | 32.787    |
| -0.1433313E-01 | -0.1454344E-01 | 0.2304328E-01 | 212.980 | 26.622  | 0.006006 | 9  | 36.885    |
| 0.2404474E-01  | -0.2507672E-02 | 0.2422469E-01 | 354.058 | 34.340  | 0.006316 | 10 | 40.984    |
| -0.2977352E-02 | -0.4625889E-03 | 0.3015081E-02 | 188.825 | 18.883  | 0.000786 |    |           |

SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 406 CTR 230 FLT 503.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.4460535E 04 |                |               |         |         |          | 1  | 4.098     |
| -0.2633500E 05 | 0.9634150E 05  | 0.4986806E 05 | 105.272 | 105.272 | 1.000000 | 2  | 8.197     |
| -0.1163474E 04 | -0.1430241E 04 | 0.1644019E 04 | 230.863 | 115.431 | 0.018465 | 3  | 12.295    |
| 0.1874070E 05  | -0.6455378E 05 | 0.7203350E 05 | 285.126 | 95.042  | 0.007213 | 4  | 16.393    |
| -0.7648381E 05 | 0.1711671E 05  | 0.7837617E 05 | 167.384 | 41.846  | 0.007848 | 5  | 20.492    |
| 0.7705655E 04  | 0.5521570E 05  | 0.7725488E 04 | 4.106   | 0.821   | 0.077357 | 6  | 24.590    |
| 0.1454740E 02  | -0.8546414E 05 | 0.8546414E 05 | 271.310 | 45.218  | 0.008500 | 7  | 28.689    |
| -0.3673382E 04 | -0.5512953E 05 | 0.5716553E 04 | 188.214 | 26.888  | 0.031215 | 8  | 32.787    |
| -0.2613022E 05 | 0.1602114E 05  | 0.2978425E 05 | 147.459 | 15.432  | 0.002982 | 9  | 36.885    |
| -0.7493127E 05 | 0.6224445E 05  | 0.9745027E 05 | 140.303 | 15.549  | 0.004756 | 10 | 40.984    |
| -0.2454124E 05 | -0.1402610E 05 | 0.3142510E 05 | 218.653 | 21.065  | 0.003147 |    |           |

PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 406 CTR 230 FLT 503.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1355157E 03 |                |               |         |         |          | 1  | 4.098     |
| -0.2644077E 03 | -0.2400022E 02 | 0.2657542E 03 | 185.183 | 185.183 | 0.933417 | 2  | 8.197     |
| 0.1410431E 03  | -0.2110955E 03 | 0.2447112E 03 | 312.145 | 156.072 | 1.000000 | 3  | 12.295    |
| 0.3444507E 02  | -0.3552912E 01 | 0.3460239E 02 | 354.795 | 115.255 | 0.134057 | 4  | 16.393    |
| -0.4440904E 02 | -0.7307330E 02 | 0.4443061E 02 | 237.850 | 59.462  | 0.246919 | 5  | 20.492    |
| -0.5314047E 02 | 0.0735560E 02  | 0.6520406E 02 | 128.636 | 25.727  | 0.249265 | 6  | 24.590    |
| -0.1825177E 01 | 0.5420180E 02  | 0.5423254E 02 | 41.924  | 15.322  | 0.140463 | 7  | 28.689    |
| 0.4444444E 01  | -0.2656010E 02 | 0.2889532E 02 | 278.657 | 34.939  | 0.101490 | 8  | 32.787    |
| 0.2033174E 01  | -0.1170642E 02 | 0.1190920E 02 | 279.781 | 34.973  | 0.042006 | 9  | 36.885    |
| -0.2424092E 01 | -0.3657604E 01 | 0.4688500E 01 | 231.357 | 25.736  | 0.016447 | 10 | 40.984    |
| 0.1512057E 02  | 0.2404018E 01  | 0.1627934E 02 | 7.557   | 0.756   | 0.064203 |    |           |

FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 406 CTR 230 FLT 503.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.3031532E 05 |                |               |         |         |          | 1  | 4.098     |
| 0.1345732E 05  | 0.2441643E 05  | 0.4411938E 05 | 49.680  | 89.680  | 1.000000 | 2  | 8.197     |
| 0.3555113E 04  | -0.1559768E 05 | 0.1599772E 05 | 262.840 | 141.420 | 0.663275 | 3  | 12.295    |
| 0.2465442E 04  | -0.1023324E 02 | 0.2465363E 04 | 359.762 | 119.921 | 0.192215 | 4  | 16.393    |
| -0.1440794E 04 | -0.1444444E 05 | 0.2072789E 04 | 230.176 | 59.044  | 0.083939 | 5  | 20.492    |
| 0.1457194E 04  | 0.4727240E 03  | 0.1505611E 04 | 71.456  | 4.247   | 0.064911 | 6  | 24.590    |
| 0.1277452E 03  | -0.2554579E 02 | 0.1407218E 03 | 315.000 | 55.838  | 0.002843 | 7  | 28.689    |
| -0.4608004E 03 | -0.5043192E 02 | 0.4608004E 03 | 167.225 | 26.746  | 0.014262 | 8  | 32.787    |
| 0.6600559E 03  | -0.5531110E 03 | 0.1171167E 04 | 305.530 | 33.191  | 0.040557 | 9  | 36.885    |
| 0.4416933E 02  | 0.4400123E 02  | 0.4608124E 02 | 29.640  | 3.294   | 0.004016 | 10 | 40.984    |
| 0.1020430E 03  | -0.2644010E 03 | 0.3101800E 03 | 301.504 | 30.150  | 0.012861 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 1 V = 154 KTS n = 1 g

FIXED HUB CHORD AT STA 18  
HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 408 CTR 230 FLT 503.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.5054094E 05  |                | 0.1008005E 06 | 96.419  | 96.419 | 1.000000 | 1  | 4.096     |
| -0.1127023E 05 | 0.1301745E 06  | 0.8747559E 04 | 118.270 | 59.135 | 0.086776 | 2  | 8.197     |
| -0.4143125E 04 | 0.7704176E 04  | 0.5601715E 04 | 237.428 | 74.143 | 0.055564 | 3  | 12.295    |
| -0.5015688E 04 | -0.4720084E 04 | 0.6891528E 03 | 95.470  | 23.858 | 0.006636 | 4  | 16.393    |
| -0.6864791E 02 | 0.6860142E 03  | 0.1910527E 04 | 354.533 | 70.907 | 0.018952 | 5  | 20.492    |
| 0.1501837E 04  | -0.1820242E 03 | 0.1237374E 04 | 303.998 | 50.666 | 0.012275 | 6  | 24.590    |
| 0.6418070E 01  | -0.1025000E 04 | 0.1337775E 04 | 173.404 | 24.772 | 0.013271 | 7  | 28.689    |
| -0.1328519E 04 | 0.1526763E 03  | 0.1701139E 04 | 279.232 | 24.904 | 0.016675 | 8  | 32.787    |
| 0.2723032E 03  | -0.1679165E 03 | 0.6591543E 03 | 198.281 | 22.331 | 0.006936 | 9  | 36.885    |
| -0.6834072E 03 | -0.2193173E 03 | 0.1102679E 04 | 250.663 | 25.066 | 0.010959 | 10 | 40.984    |
| -0.3651304E 03 | -0.1040472E 04 |               |         |        |          |    |           |

BLADE FLAP AT STA 130.5  
HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 408 CTR 230 FLT 503.0 TR 19

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.7498250E 04  |                | 0.4965624E 04 | 319.867 | 319.867 | 1.000000 | 1  | 4.096     |
| 0.3796465E 04  | -0.3200875E 04 | 0.4435137E 04 | 106.086 | 53.043  | 0.893167 | 2  | 8.197     |
| -0.1248410E 04 | 0.4261484E 04  | 0.4917703E 03 | 150.896 | 50.299  | 0.094035 | 3  | 12.295    |
| -0.4296785E 03 | 0.2391955E 03  | 0.7444470E 03 | 344.466 | 86.122  | 0.159969 | 4  | 16.393    |
| 0.7655042E 03  | -0.2124086E 03 | 0.8347278E 03 | 167.637 | 33.527  | 0.168101 | 5  | 20.492    |
| -0.5153721E 03 | 0.1707142E 03  | 0.3032050E 03 | 128.736 | 21.456  | 0.061060 | 6  | 24.590    |
| -0.1697246E 03 | 0.2365100E 03  | 0.4426565E 03 | 230.355 | 32.978  | 0.087468 | 7  | 28.689    |
| -0.2634540E 03 | -0.3420690E 02 | 0.4580520E 03 | 11.549  | 1.444   | 0.042245 | 8  | 32.787    |
| 0.4487770E 03  | 0.9170844E 02  | 0.1004166E 03 | 199.825 | 22.203  | 0.020222 | 9  | 36.885    |
| -0.5446534E 02 | -0.3405576E 02 | 0.8524907E 02 | 267.166 | 26.717  | 0.017168 | 10 | 40.984    |
| -0.4214192E 01 | -0.8514482E 02 |               |         |         |          |    |           |

BLADE FLAP AT STA 205  
HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 408 CTR 230 FLT 503.0 TR 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.8346324E 04 |                | 0.4452957E 04 | 121.241 | 121.241 | 1.000000 | 1  | 4.096     |
| -0.2307455E 04 | 0.3807264E 04  | 0.1736773E 04 | 271.668 | 145.834 | 0.340476 | 2  | 8.197     |
| 0.6620115E 01  | -0.1615407E 04 | 0.2526081E 04 | 204.861 | 68.237  | 0.567282 | 3  | 12.295    |
| -0.2291466E 04 | -0.1062015E 04 | 0.3661555E 03 | 11.639  | 2.910   | 0.086726 | 4  | 16.393    |
| 0.3782449E 03  | 0.7751064E 02  | 0.4964446E 03 | 202.736 | 40.547  | 0.111486 | 5  | 20.492    |
| -0.5706491E 03 | -0.1913672E 03 | 0.3158564E 03 | 129.902 | 21.650  | 0.070432 | 6  | 24.590    |
| -0.2026129E 03 | 0.2423090E 03  | 0.2499238E 03 | 359.425 | 51.418  | 0.067354 | 7  | 28.689    |
| 0.4992388E 03  | -0.3418165E 00 | 0.2372040E 03 | 62.328  | 7.791   | 0.053336 | 8  | 32.787    |
| 0.1102774E 03  | 0.2103393E 03  | 0.8497321E 02 | 144.525 | 16.058  | 0.014082 | 9  | 36.885    |
| -0.6917933E 02 | 0.4931433E 02  | 0.2135643E 03 | 311.195 | 31.120  | 0.047960 | 10 | 40.984    |
| 0.1406593E 03  | -0.1607000E 03 |               |         |         |          |    |           |

BLADE FLAP AT STA 235  
HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 408 CTR 230 FLT 503.0 TR 4

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.4221065E 04 |                | 0.1638403E 04 | 114.589 | 114.589 | 0.530541 | 1  | 4.096     |
| -0.6617597E 03 | 0.1484627E 04  | 0.1249028E 03 | 116.180 | 58.090  | 0.040446 | 2  | 8.197     |
| -0.5513665E 02 | 0.1120592E 03  | 0.3088104E 04 | 200.446 | 66.815  | 1.000000 | 3  | 12.295    |
| -0.2693620E 04 | -0.1078775E 04 | 0.4132761E 03 | 297.797 | 74.449  | 0.133826 | 4  | 16.393    |
| 0.1572718E 03  | -0.3632864E 03 | 0.5844741E 03 | 219.199 | 43.840  | 0.189240 | 5  | 20.492    |
| -0.4528877E 03 | 0.3692525E 03  | 0.3177346E 03 | 137.640 | 22.773  | 0.102660 | 6  | 24.590    |
| -0.2355260E 03 | 0.2132640E 03  | 0.5813067E 03 | 223.472 | 31.725  | 0.184663 | 7  | 28.689    |
| -0.4213175E 03 | -0.3454480E 03 | 0.6898509E 03 | 335.054 | 41.982  | 0.223385 | 8  | 32.787    |
| 0.2254534E 03  | -0.2907567E 03 | 0.5077175E 02 | 62.422  | 9.158   | 0.019130 | 9  | 36.885    |
| 0.7743794E 01  | 0.5656119E 02  | 0.2066516E 03 | 139.418 | 13.942  | 0.067565 | 10 | 40.984    |
| -0.1584636E 03 | 0.1357313E 03  |               |         |         |          |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 1 V= 154 KTS n= 1 g



BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 230 FLT 503.0 TR 26

| AJ            | BJ            | CJ           | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|---------------|---------------|--------------|---------|---------|----------|----|-----------|
| 0.334238E 03  | -0.207560E 03 | 0.725300E 03 | 343.371 | 343.371 | 0.267449 | 1  | 4.098     |
| 0.694766E 03  | 0.769146E 03  | 0.802314E 03 | 73.348  | 36.674  | 0.318170 | 2  | 8.197     |
| 0.230346E 03  | -0.000000E 03 | 0.252322E 04 | 194.952 | 64.651  | 1.000000 | 3  | 12.295    |
| -0.244378E 04 | -0.000000E 03 | 0.632043E 03 | 257.554 | 64.389  | 0.250490 | 4  | 16.393    |
| -0.136214E 03 | -0.617191E 03 | 0.422635E 03 | 239.650 | 47.930  | 0.167498 | 5  | 20.492    |
| -0.213546E 03 | 0.364716E 03  | 0.536740E 03 | 121.141 | 20.140  | 0.213512 | 6  | 24.590    |
| -0.278604E 03 | 0.461104E 03  | 0.427628E 03 | 215.209 | 30.744  | 0.164477 | 7  | 28.689    |
| -0.349346E 03 | -0.246552E 03 | 0.648621E 03 | 266.372 | 35.797  | 0.216676 | 8  | 32.787    |
| 0.196324E 03  | -0.670293E 03 | 0.648621E 03 | 266.372 | 35.797  | 0.216676 | 8  | 32.787    |
| -0.351373E 01 | -0.220710E 03 | 0.220710E 03 | 266.372 | 35.797  | 0.216676 | 8  | 32.787    |
| -0.133306E 03 | 0.160443E 03  | 0.224682E 03 | 126.551 | 12.655  | 0.049046 | 10 | 40.984    |

BLADE CHORD AT STA 103

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 230 FLT 503.0 TR 17

| AJ            | BJ            | CJ           | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|---------------|---------------|--------------|---------|---------|----------|----|-----------|
| 0.207322E 04  | 0.491375E 05  | 0.500229E 05 | 100.796 | 100.796 | 1.000000 | 1  | 4.098     |
| -0.337030E 04 | 0.448123E 04  | 0.458484E 04 | 77.796  | 38.848  | 0.091655 | 2  | 8.197     |
| 0.569204E 03  | -0.536084E 03 | 0.337528E 04 | 164.134 | 63.046  | 0.067475 | 3  | 12.295    |
| -0.332444E 04 | -0.719656E 03 | 0.670794E 03 | 304.311 | 76.078  | 0.017406 | 4  | 16.393    |
| 0.470855E 03  | -0.112372E 04 | 0.131321E 04 | 301.162 | 60.232  | 0.026252 | 5  | 20.492    |
| 0.726130E 03  | 0.622406E 03  | 0.615365E 03 | 49.814  | 4.302   | 0.016300 | 6  | 24.590    |
| 0.397112E 03  | 0.536442E 03  | 0.104624E 04 | 30.472  | 4.425   | 0.009916 | 7  | 28.689    |
| 0.581796E 03  | -0.194343E 02 | 0.582123E 03 | 358.382 | 44.750  | 0.011637 | 8  | 32.787    |
| -0.473767E 02 | 0.665520E 02  | 0.117446E 03 | 142.644 | 16.183  | 0.002358 | 9  | 36.885    |
| -0.249075E 03 | -0.182736E 03 | 0.309037E 03 | 216.244 | 21.629  | 0.006176 | 10 | 40.984    |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 230 FLT 503.0 TR 42

| AJ            | BJ            | CJ           | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|---------------|---------------|--------------|---------|---------|----------|----|-----------|
| 0.143675E 05  | 0.264285E 05  | 0.269318E 05 | 101.095 | 101.095 | 1.000000 | 1  | 4.098     |
| -0.518275E 04 | 0.220702E 04  | 0.244141E 04 | 64.688  | 32.344  | 0.090652 | 2  | 8.197     |
| 0.104383E 04  | -0.123205E 03 | 0.190468E 04 | 183.709 | 61.233  | 0.670908 | 3  | 12.295    |
| -0.140570E 04 | -0.606013E 03 | 0.755898E 03 | 306.636 | 76.659  | 0.028065 | 4  | 16.393    |
| 0.451086E 03  | -0.745371E 03 | 0.938512E 03 | 232.580 | 46.516  | 0.034648 | 5  | 20.492    |
| -0.570287E 03 | 0.422495E 03  | 0.594381E 03 | 45.240  | 7.540   | 0.022255 | 6  | 24.590    |
| 0.422033E 03  | 0.583861E 03  | 0.112671E 04 | 31.211  | 4.459   | 0.041836 | 7  | 28.689    |
| 0.943632E 03  | 0.664260E 02  | 0.711714E 03 | 174.604 | 21.826  | 0.026427 | 8  | 32.787    |
| -0.708565E 03 | -0.145437E 03 | 0.112706E 04 | 352.586 | 39.174  | 0.041849 | 9  | 36.885    |
| 0.111764E 04  | 0.257664E 03  | 0.476774E 03 | 32.543  | 3.254   | 0.017778 | 10 | 40.984    |

BLADE CHORD AT STA 235

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 230 FLT 503.0 TR 22

| AJ            | BJ            | CJ           | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|---------------|---------------|--------------|---------|---------|----------|----|-----------|
| -0.261064E 05 | 0.661555E 04  | 0.678796E 04 | 102.941 | 102.941 | 1.000000 | 1  | 4.098     |
| -0.152018E 04 | 0.737443E 03  | 0.116350E 04 | 140.668 | 70.334  | 0.171406 | 2  | 8.197     |
| -0.899404E 03 | 0.572447E 03  | 0.762157E 03 | 131.257 | 43.752  | 0.112278 | 3  | 12.295    |
| -0.502577E 03 | -0.228067E 03 | 0.703561E 03 | 341.035 | 85.271  | 0.103648 | 4  | 16.393    |
| 0.665570E 03  | -0.160426E 03 | 0.163113E 03 | 242.703 | 58.541  | 0.026476 | 5  | 20.492    |
| 0.766723E 02  | -0.266955E 03 | 0.348977E 03 | 310.096 | 51.583  | 0.051411 | 6  | 24.590    |
| 0.224766E 03  | -0.119606E 02 | 0.143002E 03 | 184.732 | 26.340  | 0.021362 | 7  | 28.689    |
| -0.144503E 03 | 0.303303E 03  | 0.520130E 03 | 132.529 | 16.566  | 0.076625 | 8  | 32.787    |
| -0.351357E 03 | -0.583655E 02 | 0.323908E 03 | 349.619 | 38.847  | 0.047718 | 9  | 36.885    |
| 0.318606E 03  | 0.136496E 03  | 0.194945E 03 | 135.573 | 13.557  | 0.028727 | 10 | 40.984    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 1 V= 154 KTS n= 1 g

PLATE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 408 CTR 230 FLT 503.0 TK 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.4793384E 03  |                |               |         |        |          |    |           |
| 0.1403443E 04  | 0.2427032E 04  | 0.3080140E 04 | 51.871  | 51.871 | 1.000000 | 1  | 4.098     |
| -0.7941697E 03 | 0.1094149E 04  | 0.1350036E 04 | 125.849 | 62.125 | 0.439395 | 2  | 8.147     |
| -0.3260540E 03 | -0.4854043E 03 | 0.5847466E 03 | 236.110 | 78.703 | 0.184475 | 3  | 12.295    |
| -0.3213834E 03 | 0.1377241E 02  | 0.3210824E 03 | 177.546 | 44.387 | 0.104234 | 4  | 16.393    |
| 0.8347548E 03  | -0.2711125E 03 | 0.8778677E 03 | 342.011 | 68.402 | 0.284454 | 5  | 20.492    |
| 0.1380745E 03  | -0.2077633E 03 | 0.2444200E 03 | 303.757 | 50.626 | 0.080901 | 6  | 24.590    |
| -0.3824634E 03 | 0.1037050E 03  | 0.3902427E 03 | 164.830 | 23.547 | 0.128410 | 7  | 28.689    |
| 0.5684033E 03  | -0.73.6541E 03 | 0.4276426E 03 | 307.833 | 38.479 | 0.100583 | 8  | 32.787    |
| 0.2437057E 02  | -0.2115040E 02 | 0.3226075E 02 | 314.046 | 35.450 | 0.010450 | 9  | 36.885    |
| 0.5657806E 02  | -0.4830440E 02 | 0.1134237E 03 | 299.922 | 29.942 | 0.030753 | 10 | 40.984    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 2 V= 121.5 KTS n= 1 g

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## CLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 392 FLT 503.0 TR 31

| AJ              | BJ              | CJ             | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|-----------------|-----------------|----------------|---------|---------|----------|----|-----------|
| 0.8090635E 01   |                 |                |         |         |          | 1  | 4.098     |
| 0.3835425E 01   | -0.3549701E 01  | 0.5225979E 01  | 317.216 | 317.216 | 1.000000 | 2  | 8.197     |
| -0.8856052E -01 | -0.1494567E 00  | 0.2185707E 00  | 246.111 | 123.056 | 0.041647 | 3  | 12.295    |
| -0.5942224E -01 | -0.5046484E -01 | 0.7334142E -01 | 220.103 | 73.368  | 0.014991 | 4  | 16.393    |
| -0.2413388E -01 | 0.1126571E -01  | 0.3033533E -01 | 158.177 | 39.544  | 0.005799 | 5  | 20.492    |
| 0.4196560E -01  | 0.8746516E -02  | 0.4247131E -01 | 111.772 | 2.354   | 0.008203 | 6  | 24.590    |
| -0.9246044E -02 | -0.7557842E -02 | 0.1220355E -01 | 220.712 | 36.785  | 0.002335 | 7  | 28.689    |
| -0.8363418E -02 | 0.2654228E -02  | 0.8612333E -02 | 166.200 | 23.743  | 0.001648 | 8  | 32.787    |
| 0.1129177E -03  | 0.5713355E -02  | 0.5714467E -02 | 88.868  | 11.108  | 0.001093 | 9  | 36.885    |
| 0.4636280E -02  | 0.1840671E -02  | 0.3174715E -02 | 20.837  | 2.315   | 0.000990 | 10 | 40.984    |
| -0.5255672E -03 | -0.7723438E -03 | 0.9391697E -03 | 235.971 | 23.597  | 0.000180 |    |           |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 392 FLT 503.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.5083738E 04 |                |               |         |         |          | 1  | 4.098     |
| 0.1119248E 05  | 0.5248809E 05  | 0.3369302E 05 | 77.958  | 77.958  | 1.000000 | 2  | 8.197     |
| -0.2714551E 04 | -0.1360607E 04 | 0.3045457E 04 | 206.958 | 103.479 | 0.056745 | 3  | 12.295    |
| -0.5758609E 04 | -0.1335228E 05 | 0.1402130E 05 | 245.951 | 81.384  | 0.272434 | 4  | 16.393    |
| -0.3067017E 03 | 0.1584054E 03  | 0.3431434E 03 | 152.684 | 38.171  | 0.006432 | 5  | 20.492    |
| 0.1717497E 04  | 0.5243711E 04  | 0.7517969E 04 | 71.860  | 14.372  | 0.102815 | 6  | 24.590    |
| -0.2241374E 04 | -0.5321970E 03 | 0.2336052E 04 | 193.496 | 32.249  | 0.042968 | 7  | 28.689    |
| -0.3339566E 04 | -0.1559227E 04 | 0.3732733E 04 | 205.238 | 29.370  | 0.064992 | 8  | 32.787    |
| 0.5530264E 03  | 0.7469142E 03  | 0.9233225E 03 | 53.481  | 6.085   | 0.017317 | 9  | 36.885    |
| 0.3907402E 03  | 0.4732612E 03  | 0.1044753E 04 | 68.126  | 7.570   | 0.019541 | 10 | 40.984    |
| 0.4620056E 03  | -0.1461815E 03 | 0.3013326E 03 | 336.942 | 33.699  | 0.009352 |    |           |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 392 FLT 503.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1627253E 03 |                |               |         |         |          | 1  | 4.098     |
| -0.2235010E 03 | -0.2255667E 02 | 0.2246364E 03 | 185.763 | 185.763 | 1.000000 | 2  | 8.197     |
| 0.1202626E 03  | -0.1185828E 03 | 0.1099108E 03 | 315.409 | 157.705 | 0.751757 | 3  | 12.295    |
| -0.2345118E 02 | -0.8181201E 02 | 0.9324015E 02 | 253.081 | 84.560  | 0.379485 | 4  | 16.393    |
| -0.1037185E 02 | -0.4677373E 02 | 0.4793784E 02 | 257.497 | 64.374  | 0.213277 | 5  | 20.492    |
| -0.2566452E 02 | -0.4017516E 02 | 0.4945921E 02 | 234.304 | 46.861  | 0.220219 | 6  | 24.590    |
| 0.3025118E 01  | -0.4573133E 01 | 0.1035773E 02 | 291.144 | 48.024  | 0.044738 | 7  | 28.689    |
| 0.1993377E 02  | -0.4670737E 01 | 0.2224332E 02 | 333.656 | 47.665  | 0.049021 | 8  | 32.787    |
| 0.6442752E 01  | -0.1120891E 01 | 0.6733799E 01 | 350.697 | 43.837  | 0.030867 | 9  | 36.885    |
| 0.1255444E 01  | 0.3064784E 01  | 0.3255311E 01 | 67.324  | 7.480   | 0.014447 | 10 | 40.984    |
| 0.2505572E 01  | 0.1464145E 02  | 0.1330103E 02 | 82.722  | 8.272   | 0.066147 |    |           |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 392 FLT 503.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.6620065E 04 |                |               |         |         |          | 1  | 4.098     |
| 0.1701105E 04  | 0.1215492E 05  | 0.1443706E 05 | 57.024  | 57.024  | 1.000000 | 2  | 8.197     |
| -0.4313358E 03 | -0.8466797E 04 | 0.4677695E 04 | 282.658 | 141.329 | 0.548414 | 3  | 12.295    |
| -0.1566484E 04 | -0.2333027E 04 | 0.2274335E 04 | 239.067 | 86.356  | 0.156967 | 4  | 16.393    |
| -0.2746436E 02 | -0.4976245E 03 | 0.1671708E 04 | 212.212 | 53.053  | 0.129195 | 5  | 20.492    |
| -0.3565560E 03 | -0.5439639E 03 | 0.3446637E 03 | 267.104 | 53.422  | 0.037591 | 6  | 24.590    |
| -0.4142236E 03 | -0.6524473E 03 | 0.7435515E 03 | 241.376 | 40.223  | 0.051340 | 7  | 28.689    |
| 0.6033301E 03  | -0.7176688E 03 | 0.5555733E 03 | 221.523 | 31.703  | 0.038424 | 8  | 32.787    |
| 0.2425434E 02  | -0.2778633E 03 | 0.6471737E 03 | 340.852 | 42.007  | 0.058472 | 9  | 36.885    |
| 0.7146788E 02  | 0.5425051E 02  | 0.6471737E 02 | 67.706  | 7.523   | 0.004418 | 10 | 40.984    |
|                | 0.3715467E 02  | 0.8033706E 02 | 27.456  | 2.746   | 0.005554 |    |           |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 2 V= 121.5 KTS n= 1 g

FIXED HUB CHORD AT STA 18  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 392 FLT 503.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.522260E 05   |                |               |         |        |          | 1  | 4.098     |
| 0.260153E 05   | 0.9094763E 05  | 0.9459525E 05 | 74.037  | 74.037 | 1.000000 | 2  | 8.197     |
| 0.3926220E 04  | 0.1068648E 05  | 0.1138491E 05 | 69.827  | 34.913 | 0.120354 | 3  | 12.295    |
| -0.3275745E 04 | -0.6230258E 04 | 0.7338933E 04 | 242.265 | 80.755 | 0.074411 | 4  | 16.393    |
| 0.6045345E 03  | 0.3755547E 03  | 0.7116324E 03 | 31.850  | 7.962  | 0.007524 | 5  | 20.492    |
| 0.6373985E 03  | 0.6052664E 03  | 0.8783893E 03 | 43.519  | 4.704  | 0.009292 | 6  | 24.590    |
| -0.1778626E 04 | -0.9122307E 03 | 0.1993918E 04 | 207.153 | 34.525 | 0.021131 | 7  | 28.689    |
| -0.3469346E 03 | 0.5650732E 03  | 0.6675327E 03 | 129.515 | 17.359 | 0.007057 | 8  | 32.787    |
| 0.2966519E 03  | -0.1757399E 03 | 0.3443349E 03 | 329.360 | 41.170 | 0.003645 | 9  | 36.885    |
| -0.7353159E 03 | -0.4899431E 03 | 0.8835942E 03 | 213.876 | 23.742 | 0.009341 | 10 | 40.984    |
| -0.3654136E 03 | 0.4030654E 03  | 0.5576927E 03 | 133.716 | 13.372 | 0.005896 |    |           |

BLADE FLAP AT STA 130.5  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 392 FLT 503.0 TR 19

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.9661930E 04  |                |               |         |         |          | 1  | 4.098     |
| 0.3618525E 04  | -0.2974936E 04 | 0.4634438E 04 | 320.575 | 320.575 | 1.000000 | 2  | 8.197     |
| -0.1202846E 04 | 0.2517863E 04  | 0.2733425E 04 | 115.535 | 57.768  | 0.595680 | 3  | 12.295    |
| 0.6971787E 03  | 0.3453848E 03  | 0.9168103E 03 | 43.497  | 13.499  | 0.195714 | 4  | 16.393    |
| 0.6161882E 03  | -0.1262680E 02 | 0.6163057E 03 | 358.882 | 89.720  | 0.131564 | 5  | 20.492    |
| 0.3542578E 02  | 0.9625873E 02  | 0.1023706E 03 | 69.795  | 13.959  | 0.021896 | 6  | 24.590    |
| 0.4865440E 03  | -0.1571754E 03 | 0.5113483E 03 | 342.099 | 57.016  | 0.109159 | 7  | 28.689    |
| 0.2119520E 03  | -0.3362512E 03 | 0.3774773E 03 | 302.225 | 43.7    | 0.084851 | 8  | 32.787    |
| 0.2341216E 03  | 0.3461626E 03  | 0.4542422E 03 | 49.647  | 6.206   | 0.056908 | 9  | 36.885    |
| 0.9290310E 01  | 0.1159616E 03  | 0.1172230E 03 | 85.557  | 9.506   | 0.023600 | 10 | 40.984    |
| 0.1495375E 03  | -0.1335205E 02 | 0.1501324E 03 | 354.997 | 35.493  | 0.032049 |    |           |

BLADE FLAP AT STA 205  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 392 FLT 503.0 TR 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.7332012E 04 |                |               |         |         |          | 1  | 4.098     |
| -0.1942244E 04 | 0.3563580E 04  | 0.4545231E 04 | 118.592 | 118.592 | 1.000000 | 2  | 8.197     |
| 0.1734232E 04  | -0.1348288E 04 | 0.2136707E 04 | 322.136 | 161.369 | 0.541273 | 3  | 12.295    |
| -0.1132670E 04 | -0.4155820E 03 | 0.1206533E 04 | 200.145 | 66.715  | 0.297323 | 4  | 16.393    |
| 0.4244007E 03  | 0.6319221E 02  | 0.4345796E 03 | 8.361   | 2.093   | 0.107076 | 5  | 20.492    |
| -0.1244315E 03 | -0.5115750E 03 | 0.5264902E 03 | 256.329 | 51.266  | 0.129725 | 6  | 24.590    |
| 0.2101045E 03  | 0.8956669E 02  | 0.2287643E 03 | 23.185  | 3.864   | 0.056317 | 7  | 28.689    |
| 0.9618532E 02  | -0.2151785E 02 | 0.7355312E 02 | 347.163 | 49.595  | 0.024307 | 8  | 32.787    |
| -0.1061886E 03 | 0.1261460E 03  | 0.1648775E 03 | 130.085 | 16.261  | 0.040625 | 9  | 36.885    |
| 0.4397061E 02  | -0.3577343E 02 | 0.3663515E 02 | 320.869 | 35.652  | 0.013967 | 10 | 40.984    |
| 0.4510704E 02  | 0.3048335E 02  | 0.5444142E 02 | 34.051  | 3.405   | 0.013414 |    |           |

BLADE FLAP AT STA 235  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 392 FLT 503.0 TR 4

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.1560308E 04 |                |               |         |        |          | 1  | 4.098     |
| -0.2698943E 04 | 0.1548048E 04  | 0.1620671E 04 | 49.586  | 49.586 | 0.999870 | 2  | 8.197     |
| 0.1584105E 04  | 0.3154170E 03  | 0.1623384E 04 | 11.565  | 3.883  | 1.000000 | 3  | 12.295    |
| -0.4096031E 03 | -0.2864827E 03 | 0.3331335E 03 | 215.016 | 71.672 | 0.308555 | 4  | 16.393    |
| 0.7457417E 03  | -0.4100613E 00 | 0.7317417E 03 | 359.970 | 87.992 | 0.483526 | 5  | 20.492    |
| 0.1719054E 03  | -0.1104377E 03 | 0.2037432E 03 | 327.221 | 62.444 | 0.125850 | 6  | 24.590    |
| 0.1171140E 03  | 0.4202673E 02  | 0.1469454E 03 | 36.160  | 6.360  | 0.051891 | 7  | 28.689    |
| -0.2066727E 02 | -0.3444640E 03 | 0.3430574E 03 | 266.506 | 38.381 | 0.212900 | 8  | 32.787    |
| 0.5883614E 03  | 0.2386013E 03  | 0.6333674E 03 | 22.142  | 2.768  | 0.393368 | 9  | 36.885    |
| 0.2243301E 02  | -0.7557710E 01 | 0.2310357E 02 | 340.469 | 37.833 | 0.014686 | 10 | 40.984    |
| -0.4594348E 02 | -0.1141873E 03 | 0.1231022E 03 | 248.061 | 24.300 | 0.075447 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 2 V= 121.5 KTS n= 1 g

## BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 392 FLT 503.0 TR 26

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2795132E 04  |                |               |         |         |          | 1  | 4.098     |
| 0.2967131E 03  | -0.1770235E 02 | 0.8709426E 03 | 358.869 | 358.869 | 0.991861 | 2  | 8.197     |
| 0.5908731E 03  | 0.1631885E 03  | 0.6153442E 03 | 15.839  | 7.744   | 0.679357 | 3  | 12.295    |
| -0.5746525E 03 | -0.9770026E 02 | 0.9043333E 03 | 186.177 | 62.054  | 1.000000 | 4  | 16.393    |
| 0.5686064E 03  | -0.2345776E 03 | 0.5420312E 03 | 334.354 | 83.589  | 0.599358 | 5  | 20.492    |
| 0.5425443E 01  | -0.3507451E 03 | 0.3517452E 03 | 270.968 | 54.194  | 0.387416 | 6  | 24.590    |
| -0.2091404E 03 | -0.5655777E 02 | 0.2167316E 03 | 195.129 | 32.221  | 0.239634 | 7  | 28.685    |
| -0.2031232E 03 | -0.2341311E 03 | 0.3130273E 03 | 229.042 | 32.720  | 0.342836 | 8  | 32.787    |
| 0.3739763E 03  | -0.1343035E 02 | 0.4926372E 03 | 344.160 | 43.022  | 0.544770 | 9  | 36.885    |
| 0.3360406E 02  | -0.6746486E 02 | 0.3076000E 02 | 302.675 | 33.631  | 0.069314 | 10 | 40.984    |
| -0.3341344E 02 | -0.1563226E 03 | 0.1572537E 03 | 253.490 | 25.694  | 0.176107 |    |           |

## BLADE CHORD AT STA 103

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 392 FLT 503.0 TR 17

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2155556E 06  |                |               |         |        |          | 1  | 4.098     |
| 0.7193554E 04  | 0.4545188E 05  | 0.4671153E 05 | 81.103  | 81.103 | 1.000000 | 2  | 8.197     |
| -0.3657726E 02 | 0.4338743E 04  | 0.4338945E 04 | 90.483  | 45.242 | 0.093287 | 3  | 12.295    |
| -0.5083371E 04 | -0.4045349E 04 | 0.7305623E 04 | 213.623 | 71.208 | 0.157071 | 4  | 16.393    |
| 0.1883504E 04  | -0.8636953E 03 | 0.2372334E 04 | 333.368 | 83.341 | 0.044350 | 5  | 20.492    |
| -0.1854426E 04 | -0.1053805E 04 | 0.2133230E 04 | 207.603 | 41.971 | 0.045066 | 6  | 24.590    |
| -0.6115754E 03 | -0.8166849E 03 | 0.1020233E 04 | 233.172 | 38.862 | 0.021936 | 7  | 28.685    |
| -0.2589446E 03 | -0.5575007E 03 | 0.0517236E 03 | 243.042 | 35.012 | 0.013217 | 8  | 32.787    |
| 0.6166230E 03  | -0.7276831E 03 | 0.4933306E 03 | 310.277 | 38.765 | 0.020507 | 9  | 36.885    |
| 0.3480007E 03  | -0.3171484E 03 | 0.4708372E 03 | 317.656 | 35.295 | 0.010123 | 10 | 40.984    |
| -0.4478523E 03 | -0.5268584E 03 | 0.6367243E 03 | 229.310 | 22.731 | 0.014769 |    |           |

## BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 392 FLT 503.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2337273E 05  |                |               |         |        |          | 1  | 4.098     |
| 0.4018930E 04  | 0.2307208E 05  | 0.2341943E 05 | 80.119  | 80.119 | 1.000000 | 2  | 8.197     |
| -0.3552207E 03 | 0.4824365E 03  | 0.1045133E 04 | 104.869 | 54.935 | 0.044627 | 3  | 12.295    |
| -0.4774145E 04 | -0.9159331E 03 | 0.4861766E 04 | 190.407 | 63.636 | 0.207603 | 4  | 16.393    |
| 0.1261082E 04  | -0.4400504E 03 | 0.1335056E 04 | 340.763 | 85.191 | 0.057032 | 5  | 20.492    |
| -0.1743224E 04 | -0.7256223E 03 | 0.1334572E 04 | 202.714 | 40.543 | 0.080684 | 6  | 24.590    |
| -0.5814336E 03 | -0.3035676E 03 | 0.6035355E 03 | 207.549 | 34.591 | 0.028026 | 7  | 28.685    |
| -0.4129624E 03 | -0.1347287E 03 | 0.4344313E 03 | 148.068 | 28.295 | 0.018544 | 8  | 32.787    |
| -0.8655501E 03 | -0.5353942E 03 | 0.1274443E 04 | 227.220 | 28.402 | 0.054418 | 9  | 36.885    |
| -0.8784587E 03 | -0.5565905E 03 | 0.1033746E 03 | 212.359 | 23.595 | 0.044405 | 10 | 40.984    |
| -0.5974221E 03 | -0.1373235E 03 | 0.6134315E 03 | 192.935 | 19.293 | 0.026196 |    |           |

## BLADE CHORD AT STA 235

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 392 FLT 503.0 TR 22

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.2550624E 05 |                |               |         |        |          | 1  | 4.098     |
| 0.1228141E 04  | 0.6236535E 04  | 0.6358273E 04 | 78.863  | 78.863 | 1.000000 | 2  | 8.197     |
| 0.5705215E 03  | 0.1774554E 04  | 0.1454313E 04 | 72.177  | 36.089 | 0.293163 | 3  | 12.295    |
| -0.4441637E 02 | -0.4619939E 03 | 0.4027341E 03 | 266.525 | 88.842 | 0.063340 | 4  | 16.393    |
| 0.6244717E 03  | 0.5444943E 02  | 0.6266403E 03 | 4.963   | 1.246  | 0.098567 | 5  | 20.492    |
| -0.4021189E 03 | 0.4586123E 03  | 0.6399382E 03 | 131.245 | 26.249 | 0.095428 | 6  | 24.590    |
| 0.5414109E 03  | 0.8084337E 02  | 0.5474133E 03 | 8.493   | 1.415  | 0.086095 | 7  | 28.685    |
| -0.9952798E 02 | -0.3167769E 01 | 0.4457837E 02 | 181.623 | 25.975 | 0.015661 | 8  | 32.787    |
| -0.4243221E 02 | -0.4882672E 02 | 0.4357375E 03 | 193.109 | 24.134 | 0.068531 | 9  | 36.885    |
| -0.1433465E 03 | -0.1205498E 03 | 0.1873335E 03 | 220.052 | 24.450 | 0.029463 | 10 | 40.984    |
| -0.1449407E 03 | 0.5052247E 01  | 0.1495051E 03 | 176.516 | 17.652 | 0.030676 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 2 V= 121.5 KTS n= 1 g

BLADE TORSION AT STA 131.5  
HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 408 CTR 392 FLT 503.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|-----------|----|-----------|
| 0.1341356E 03  |                |               |         |        |           | 1  | 4.098     |
| 0.1636148E 04  | 0.1425133E 04  | 0.2661752E 04 | 46.324  | 46.324 | 1.0000000 | 2  | 8.197     |
| -0.1270372E 04 | 0.4470125E 03  | 0.1304136E 04 | 158.633 | 79.316 | 0.512495  | 3  | 12.295    |
| -0.5413262E 03 | 0.1915457E 03  | 0.6215757E 03 | 162.052 | 54.017 | 0.233521  | 4  | 16.393    |
| -0.2018650E 03 | -0.1646951E 01 | 0.2018734E 03 | 180.524 | 45.131 | 0.075842  | 5  | 20.492    |
| -0.1506653E 02 | -0.1713335E 02 | 0.2281553E 02 | 228.673 | 45.735 | 0.008572  | 6  | 24.590    |
| -0.6186967E 03 | -0.2556555E 03 | 0.3573784E 03 | 197.593 | 32.932 | 0.322744  | 7  | 28.684    |
| -0.4675313E 03 | -0.1305152E 03 | 0.4654067E 03 | 195.598 | 27.942 | 0.182364  | 8  | 32.787    |
| 0.3865647E 03  | -0.4145303E 03 | 0.5665047E 03 | 313.000 | 39.125 | 0.212944  | 9  | 36.885    |
| 0.1065141E 02  | -0.3309781E 02 | 0.3470947E 02 | 287.839 | 31.982 | 0.013063  | 10 | 40.984    |
| 0.8951261E 02  | 0.7687267E 02  | 0.1135291E 03 | 41.289  | 4.129  | 0.044906  |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 3 V= 190 KTS n= 1 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 335 FLT 503.0 TR 31

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.5424483E 01  |                |               |         |         |          | 1  | 4.098     |
| 0.2615634E 01  | -0.2427473E 01 | 0.3554836E 01 | 317.131 | 317.131 | 1.000000 | 2  | 8.197     |
| -0.2427473E 00 | -0.2167934E 00 | 0.3275004E 03 | 221.761 | 110.881 | 0.091209 | 3  | 12.295    |
| -0.1127580E 00 | -0.8540017E-01 | 0.1434238E 03 | 219.399 | 72.800  | 0.040330 | 4  | 16.393    |
| -0.2821414E 00 | -0.1658700E 00 | 0.3275033E 03 | 211.033 | 52.758  | 0.092328 | 5  | 20.492    |
| -0.6382406E-01 | -0.5565418E-01 | 0.8463113E-01 | 221.008 | 44.218  | 0.023720 | 6  | 24.590    |
| -0.1026555E 00 | -0.5527657E-01 | 0.1167333E 03 | 209.262 | 34.710  | 0.032722 | 7  | 28.689    |
| -0.3307563E-01 | -0.3128464E-01 | 0.4862421E-01 | 223.738 | 31.970  | 0.013073 | 8  | 32.787    |
| -0.6256758E-01 | -0.5621767E-01 | 0.8412910E-01 | 221.931 | 27.741  | 0.023573 | 9  | 36.885    |
| -0.3569777E-01 | -0.1507262E-01 | 0.3767253E-01 | 202.329 | 22.481  | 0.011116 | 10 | 40.984    |
| -0.3642631E-01 | -0.2179638E-01 | 0.4244947E-01 | 210.895 | 21.087  | 0.011894 |    |           |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 335 FLT 503.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.7392255E 04 |                |               |         |         |          | 1  | 4.098     |
| -0.3312531E 05 | 0.1177285E 06  | 0.1215219E 05 | 104.353 | 104.353 | 1.000000 | 2  | 8.197     |
| -0.3305364E 04 | 0.7552267E 02  | 0.3010316E 04 | 178.562 | 89.281  | 0.024772 | 3  | 12.295    |
| 0.3720170E 04  | 0.1113208E 05  | 0.1173725E 05 | 71.521  | 23.840  | 0.056586 | 4  | 16.393    |
| 0.9561553E 03  | -0.5002031E 03 | 0.1077333E 04 | 332.384 | 83.096  | 0.008880 | 5  | 20.492    |
| 0.1182265E 05  | -0.2578087E 04 | 0.1210044E 05 | 347.648 | 69.540  | 0.099575 | 6  | 24.590    |
| 0.1136733E 04  | 0.1354898E 04  | 0.1773735E 04 | 50.058  | 8.343   | 0.014596 | 7  | 28.689    |
| 0.1930426E 04  | -0.2007311E 04 | 0.2734431E 04 | 313.881 | 44.840  | 0.022917 | 8  | 32.787    |
| -0.1250455E 04 | 0.1633306E 04  | 0.2219334E 04 | 124.307 | 15.538  | 0.018264 | 9  | 36.885    |
| -0.2295657E 04 | 0.2503871E 04  | 0.3377135E 04 | 132.518 | 14.724  | 0.027955 | 10 | 40.984    |
| 0.4037777E 03  | -0.5724590E 02 | 0.4079226E 03 | 351.924 | 35.172  | 0.003356 |    |           |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 335 FLT 503.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1045320E 03 |                |               |         |         |          | 1  | 4.098     |
| -0.2319457E 03 | 0.1687218E 02  | 0.2823531E 03 | 176.574 | 176.574 | 0.662311 | 2  | 8.197     |
| 0.2983044E 03  | -0.3045566E 03 | 0.4253103E 03 | 314.406 | 157.203 | 1.000000 | 3  | 12.295    |
| 0.8924068E 02  | 0.2448533E 02  | 0.4243127E 02 | 15.591  | 5.197   | 0.218060 | 4  | 16.393    |
| -0.7305630E 02 | -0.1274645E 03 | 0.1469107E 03 | 240.181 | 60.045  | 0.344624 | 5  | 20.492    |
| -0.3386762E 02 | 0.7262071E 02  | 0.7343513E 02 | 112.988 | 22.598  | 0.185042 | 6  | 24.590    |
| 0.4169133E 02  | 0.4555333E 02  | 0.1012303E 03 | 66.428  | 11.071  | 0.244495 | 7  | 28.689    |
| -0.6544444E 00 | -0.7415633E 01 | 0.2510112E 01 | 254.170 | 36.310  | 0.005640 | 8  | 32.787    |
| 0.5727255E 01  | -0.6530524E 01 | 0.3656546E 01 | 311.254 | 38.907  | 0.020376 | 9  | 36.885    |
| -0.1081575E 02 | -0.1421811E 02 | 0.1716435E 02 | 232.740 | 25.360  | 0.041405 | 10 | 40.984    |
| 0.1347716E 02  | 0.1236879E 02  | 0.1322517E 02 | 42.313  | 4.231   | 0.042751 |    |           |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 335 FLT 503.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.4655154E 03 |                |               |         |         |          | 1  | 4.098     |
| 0.4742295E 03  | 0.2904622E 05  | 0.2935001E 05 | 89.065  | 89.065  | 1.000000 | 2  | 8.197     |
| 0.3942571E 04  | -0.2180569E 05 | 0.2215033E 05 | 280.121 | 140.061 | 0.762440 | 3  | 12.295    |
| 0.3102556E 04  | -0.2451767E 05 | 0.3115907E 04 | 354.488 | 118.163 | 0.107296 | 4  | 16.393    |
| -0.3912485E 04 | 0.8076518E 04  | 0.3775435E 04 | 191.665 | 47.910  | 0.137535 | 5  | 20.492    |
| 0.2328606E 04  | 0.5606576E 04  | 0.2331731E 04 | 12.120  | 2.424   | 0.081988 | 6  | 24.590    |
| 0.1480106E 04  | -0.6234304E 03 | 0.1603364E 04 | 337.139 | 56.193  | 0.053265 | 7  | 28.689    |
| 0.2053313E 03  | -0.1516464E 03 | 0.2733337E 03 | 323.267 | 46.224  | 0.006790 | 8  | 32.787    |
| 0.1485688E 04  | -0.4455560E 05 | 0.1551235E 04 | 343.307 | 42.713  | 0.053399 | 9  | 36.885    |
| -0.5305173E 03 | 0.1671618E 03  | 0.5552247E 03 | 152.511 | 18.057  | 0.019147 | 10 | 40.984    |
| -0.3195844E 03 | -0.1741412E 03 | 0.3639534E 03 | 208.566 | 20.359  | 0.012528 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 3 V= 190 KTS n= 1 g

FIXED HUB CHORD AT STA 18  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 335 FLT 503.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.5227957E 05  |                |               |         |        |          | 1  | 4.098     |
| -0.1470455E 05 | 0.1038543E 06  | 0.1048703E 06 | 98.059  | 98.059 | 1.000000 | 2  | 8.197     |
| -0.1520275E 04 | 0.5853391E 04  | 0.6047534E 04 | 104.563 | 52.280 | 0.057656 | 3  | 12.295    |
| -0.4113203E 04 | -0.4722492E 04 | 0.0262617E 04 | 226.445 | 76.315 | 0.059706 | 4  | 16.393    |
| -0.1254230E 04 | 0.2055415E 03  | 0.1273963E 04 | 170.693 | 42.673 | 0.012117 | 5  | 20.492    |
| 0.2244544E 04  | -0.1473530E 04 | 0.2731136E 04 | 327.348 | 65.473 | 0.026038 | 6  | 24.590    |
| 0.1140557E 04  | -0.3026169E 04 | 0.3270294E 04 | 290.288 | 48.381 | 0.031369 | 7  | 28.689    |
| 0.2603510E 02  | -0.2301925E 03 | 0.2316602E 03 | 276.453 | 39.493 | 0.002209 | 8  | 32.787    |
| 0.1308291E 04  | -0.1563353E 04 | 0.2477633E 04 | 323.317 | 40.040 | 0.023640 | 9  | 36.885    |
| -0.4254204E 03 | -0.1354629E 04 | 0.1352323E 04 | 253.071 | 28.119 | 0.013946 | 10 | 40.984    |
| 0.4496169E 03  | -0.7535934E 03 | 0.9123345E 03 | 299.551 | 29.955 | 0.006695 |    |           |

BLADE FLAP AT STA 130.5  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 335 FLT 503.0 TR 19

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.6993684E 04  |                |               |         |         |          | 1  | 4.098     |
| 0.4065491E 04  | -0.2382974E 04 | 0.4713630E 04 | 329.611 | 329.611 | 0.901475 | 2  | 8.197     |
| -0.4513145E 03 | 0.5206000E 04  | 0.5225523E 04 | 94.955  | 47.477  | 1.000000 | 3  | 12.295    |
| -0.2717607E 03 | -0.5526860E 03 | 0.6158860E 03 | 243.816 | 81.272  | 0.117861 | 4  | 16.393    |
| 0.1776194E 04  | -0.6837850E 03 | 0.1033267E 04 | 339.945 | 84.736  | 0.364225 | 5  | 20.492    |
| -0.7343167E 03 | 0.3989082E 03  | 0.8336726E 03 | 151.488 | 30.298  | 0.154421 | 6  | 24.590    |
| -0.3310417E 03 | 0.4192603E 03  | 0.9770303E 03 | 109.805 | 18.301  | 0.166977 | 7  | 28.689    |
| -0.2079543E 03 | 0.1172666E 02  | 0.2332844E 03 | 176.774 | 25.253  | 0.039859 | 8  | 32.787    |
| 0.3041782E 03  | 0.2476844E 03  | 0.3361543E 03 | 36.698  | 4.837   | 0.075811 | 9  | 36.885    |
| -0.1462139E 03 | -0.2106426E 02 | 0.1477234E 03 | 188.198 | 20.911  | 0.026270 | 10 | 40.984    |
| -0.1126245E 03 | -0.2531356E 03 | 0.2771436E 03 | 245.977 | 24.598  | 0.053036 |    |           |

BLADE FLAP AT STA 205  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 335 FLT 503.0 TR 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.9489444E 04 |                |               |         |         |          | 1  | 4.098     |
| -0.2110544E 04 | 0.3837438E 04  | 0.4373535E 04 | 118.810 | 118.810 | 1.000000 | 2  | 8.197     |
| 0.3167583E 03  | -0.1675855E 04 | 0.1735523E 04 | 280.703 | 140.352 | 0.389431 | 3  | 12.295    |
| -0.3205871E 04 | -0.4852486E 03 | 0.3242394E 04 | 188.608 | 62.869  | 0.740351 | 4  | 16.393    |
| 0.1166445E 04  | 0.1662515E 03  | 0.1174233E 04 | 8.112   | 2.028   | 0.269032 | 5  | 20.492    |
| -0.3145007E 03 | 0.7870366E 02  | 0.3230315E 03 | 166.162 | 33.232  | 0.075134 | 6  | 24.590    |
| -0.2327661E 03 | 0.6413206E 03  | 0.5322511E 03 | 109.448 | 18.325  | 0.155765 | 7  | 28.689    |
| 0.1259671E 02  | -0.9245714E 02 | 0.9331047E 02 | 277.755 | 39.679  | 0.021306 | 8  | 32.787    |
| -0.9494581E 02 | 0.4124854E 03  | 0.4232725E 03 | 132.903 | 12.870  | 0.096648 | 9  | 36.885    |
| -0.1504495E 03 | -0.1671202E 03 | 0.1347239E 03 | 215.444 | 23.938  | 0.042178 | 10 | 40.984    |
| -0.8546310E 02 | -0.9310182E 02 | 0.1264336E 03 | 227.439 | 22.744  | 0.028862 |    |           |

BLADE FLAP AT STA 235  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 335 FLT 503.0 TR 4

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.5262406E 04 |                |               |         |        |          | 1  | 4.098     |
| -0.1336175E 03 | 0.1641902E 04  | 0.1846782E 04 | 94.132  | 94.132 | 0.487933 | 2  | 8.197     |
| 0.2340745E 03  | 0.7183320E 03  | 0.7555030E 03 | 71.951  | 35.975 | 0.199611 | 3  | 12.295    |
| -0.3735732E 04 | -0.6081514E 03 | 0.3794710E 04 | 184.246 | 63.082 | 1.000000 | 4  | 16.393    |
| 0.3761355E 03  | -0.7057148E 03 | 0.7787557E 03 | 297.930 | 74.463 | 0.211037 | 5  | 20.492    |
| -0.4213101E 03 | -0.8190808E 02 | 0.4241930E 03 | 191.002 | 38.203 | 0.113397 | 6  | 24.590    |
| -0.2324901E 02 | 0.9785117E 03  | 0.9736172E 03 | 91.478  | 15.246 | 0.258503 | 7  | 28.689    |
| -0.2065741E 03 | 0.2365545E 03  | 0.3223174E 03 | 139.169 | 19.881 | 0.093085 | 8  | 32.787    |
| 0.3784214E 03  | 0.4981830E 02  | 0.3817261E 03 | 7.499   | 0.937  | 0.100855 | 9  | 36.885    |
| -0.3418426E 03 | 0.2243136E 03  | 0.4043676E 03 | 140.727 | 16.303 | 0.108026 | 10 | 40.984    |
| -0.3264704E 03 | 0.1611443E 03  | 0.3436507E 03 | 162.085 | 16.288 | 0.070805 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 3 V= 190 KTS n= 1 g

BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 335 FLT 503.0 TR 26

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1031180E 04 |                |               |         |         |          | 1  | 4.098     |
| 0.3734550E 03  | -0.9767534E 02 | 0.3803012E 03 | 345.362 | 345.362 | 0.115174 | 2  | 8.197     |
| 0.1061398E 03  | 0.1360375E 04  | 0.1373471E 04 | 85.558  | 42.779  | 0.408396 | 3  | 12.295    |
| -0.3346530E 04 | 0.2455945E 03  | 0.3355791E 04 | 175.837 | 58.612  | 1.000000 | 4  | 16.393    |
| -0.1073720E 03 | -0.5469209E 03 | 0.5573611E 03 | 258.893 | 64.723  | 0.166089 | 5  | 20.492    |
| -0.2610550E 03 | -0.2383348E 03 | 0.3534356E 03 | 222.395 | 44.479  | 0.105336 | 6  | 24.590    |
| 0.1726100E 03  | 0.628268E 03   | 0.3450632E 03 | 78.214  | 13.036  | 0.252120 | 7  | 28.685    |
| -0.3450339E 03 | 0.5133770E 03  | 0.6185533E 03 | 123.905 | 17.701  | 0.184323 | 8  | 32.787    |
| 0.2337632E 03  | 0.1022951E 03  | 0.301634E 03  | 19.824  | 2.478   | 0.089886 | 9  | 36.885    |
| -0.3210224E 03 | 0.1439753E 03  | 0.3518320E 03 | 155.844 | 17.316  | 0.104843 | 10 | 40.984    |
| -0.2956641E 03 | 0.1362733E 03  | 0.3255637E 03 | 155.252 | 15.525  | 0.097016 |    |           |

BLADE CHORD AT STA 103

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 335 FLT 503.0 TR 17

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2098255E 06  |                |               |         |         |          | 1  | 4.098     |
| -0.1294435E 05 | 0.4875597E 05  | 0.5043735E 05 | 104.850 | 104.356 | 1.000000 | 2  | 8.197     |
| -0.7797229E 03 | 0.1620751E 04  | 0.1778553E 04 | 115.692 | 57.840  | 0.035624 | 3  | 12.295    |
| -0.2064548E 03 | 0.2179130E 04  | 0.2188844E 04 | 95.412  | 31.804  | 0.043355 | 4  | 16.393    |
| 0.9283653E 03  | -0.5073350E 03 | 0.1057964E 04 | 331.344 | 82.836  | 0.020955 | 5  | 20.492    |
| 0.1126461E 04  | -0.6454521E 03 | 0.1333012E 04 | 330.231 | 66.046  | 0.025749 | 6  | 24.590    |
| 0.9200493E 03  | -0.722378E 03  | 0.1173330E 04 | 321.637 | 53.806  | 0.023241 | 7  | 28.685    |
| 0.6629502E 03  | -0.4673050E 02 | 0.6645335E 03 | 355.968 | 50.853  | 0.015164 | 8  | 32.787    |
| -0.7497100E 03 | 0.5075554E 03  | 0.7033638E 03 | 145.902 | 18.238  | 0.017432 | 9  | 36.885    |
| -0.3470562E 03 | 0.4564922E 03  | 0.5734521E 03 | 127.218 | 14.135  | 0.011366 | 10 | 40.984    |
| -0.1060752E 04 | 0.1729375E 03  | 0.1074730E 04 | 170.741 | 17.074  | 0.021268 |    |           |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 335 FLT 503.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2142186E 05  |                |               |         |         |          | 1  | 4.098     |
| -0.5929320E 04 | 0.2639836E 05  | 0.2705605E 05 | 102.654 | 102.654 | 1.000000 | 2  | 8.197     |
| -0.5193153E 03 | 0.1104237E 04  | 0.1223254E 04 | 115.188 | 57.594  | 0.045101 | 3  | 12.295    |
| -0.4746006E 03 | 0.1775035E 04  | 0.1835463E 04 | 104.985 | 34.995  | 0.067839 | 4  | 16.393    |
| 0.2179703E 04  | -0.3600643E 03 | 0.2212591E 04 | 350.109 | 87.527  | 0.081774 | 5  | 20.492    |
| -0.6217414E 04 | -0.4658567E 03 | 0.4737526E 03 | 262.462 | 52.492  | 0.017517 | 6  | 24.590    |
| 0.1299276E 03  | -0.1611035E 03 | 0.2063714E 03 | 308.388 | 51.481  | 0.007650 | 7  | 28.685    |
| 0.4234685E 03  | -0.3213602E 03 | 0.5313873E 03 | 322.765 | 40.109  | 0.019659 | 8  | 32.787    |
| -0.7136887E 03 | 0.4574131E 03  | 0.1174136E 04 | 126.701 | 15.838  | 0.044136 | 9  | 36.885    |
| 0.1935620E 03  | 0.1142382E 04  | 0.1158600E 04 | 80.363  | 6.931   | 0.042825 | 10 | 40.984    |
| -0.9540459E 03 | 0.8256006E 03  | 0.1265455E 04 | 139.276 | 13.928  | 0.046772 |    |           |

BLADE CHORD AT STA 235

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 335 FLT 503.0 TR 22

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2568202E 05 |                |               |         |         |          | 1  | 4.098     |
| -0.1177779E 04 | 0.6665865E 04  | 0.6769824E 04 | 100.019 | 100.019 | 1.000000 | 2  | 8.197     |
| 0.5004711E 02  | -0.1435451E 03 | 0.1523559E 03 | 289.239 | 144.619 | 0.022458 | 3  | 12.295    |
| 0.6000081E 03  | -0.2284801E 03 | 0.6422151E 03 | 339.112 | 113.037 | 0.094864 | 4  | 16.393    |
| 0.6193003E 03  | -0.8453245E 03 | 0.1047906E 04 | 306.227 | 76.557  | 0.154791 | 5  | 20.492    |
| -0.1488249E 03 | -0.6423947E 03 | 0.6234136E 03 | 250.956 | 51.391  | 0.097405 | 6  | 24.590    |
| -0.7508675E 02 | -0.4572612E 03 | 0.4633853E 03 | 260.675 | 43.446  | 0.068449 | 7  | 28.685    |
| 0.1073278E 03  | -0.1637513E 03 | 0.1957911E 03 | 303.242 | 43.320  | 0.028921 | 8  | 32.787    |
| -0.4363064E 03 | -0.8555609E 02 | 0.4446162E 03 | 191.094 | 23.887  | 0.065076 | 9  | 36.885    |
| -0.1832472E 03 | 0.4841604E 03  | 0.5150685E 03 | 110.810 | 12.312  | 0.076192 | 10 | 40.984    |
| -0.2441526E 03 | -0.4357144E 02 | 0.2523732E 03 | 189.918 | 18.792  | 0.037368 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 3 V= 190 KTS n= 1 g

BLADE TORSION AT STA 131.5  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 408 CTR 335 FLT 503.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.5585445E 03  |                |               |         |        |          |    |           |
| 0.1671450E 04  | 0.2464649E 04  | 0.2477931E 04 | 55.855  | 55.855 | 1.000000 | 1  | 4.098     |
| -0.1851675E 04 | 0.1787361E 04  | 0.2559235E 04 | 135.702 | 67.851 | 0.859386 | 2  | 8.197     |
| -0.8748076E 03 | 0.9752259E 01  | 0.8748023E 03 | 179.359 | 59.786 | 0.293777 | 3  | 12.295    |
| -0.2676360E 03 | 0.3773154E 03  | 0.4625909E 03 | 125.349 | 31.337 | 0.155339 | 4  | 16.393    |
| 0.1300195E 04  | -0.5440698E 03 | 0.1409437E 04 | 337.293 | 67.459 | 0.473267 | 5  | 20.492    |
| 0.3337545E 03  | -0.8831040E 03 | 0.7490634E 03 | 290.703 | 48.451 | 0.317016 | 6  | 24.590    |
| -0.1844562E 03 | 0.1668933E 03  | 0.2447513E 03 | 137.662 | 19.695 | 0.083530 | 7  | 28.689    |
| 0.7378628E 03  | 0.5753343E 02  | 0.7401530E 03 | 4.489   | 0.561  | 0.248542 | 8  | 32.787    |
| -0.2071030E 03 | 0.3748401E 03  | 0.4292433E 03 | 118.921 | 13.213 | 0.143605 | 9  | 36.885    |
| -0.8347525E 02 | 0.1384531E 03  | 0.1516735E 03 | 121.086 | 12.109 | 0.054289 | 10 | 40.984    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 4 V= 163.5 KTS n= 1 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 31

| AJ              | BJ              | CJ             | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|-----------------|-----------------|----------------|---------|---------|----------|----|-----------|
| 0.7086332E 01   |                 |                |         |         |          |    |           |
| -0.2887794E 01  | -0.3610663E 01  | 0.4523445E 01  | 308.653 | 308.653 | 1.000000 | 1  | 4.065     |
| -0.2239363E 00  | -0.2547259E 00  | 0.3391647E 00  | 228.680 | 114.340 | 0.073398 | 2  | 8.130     |
| -0.1092243E 00  | -0.6323081E -01 | 0.1262065E 00  | 210.067 | 70.022  | 0.027297 | 3  | 12.195    |
| -0.1228452E -02 | -0.1534551E -01 | 0.1339447E -01 | 266.366 | 66.592  | 0.004193 | 4  | 16.260    |
| -0.5467688E -03 | -0.2531135E -01 | 0.2531725E -01 | 268.762 | 53.752  | 0.005476 | 5  | 20.325    |
| -0.1532835E -01 | 0.3704548E -02  | 0.1575965E -01 | 160.413 | 27.736  | 0.003411 | 6  | 24.390    |
| -0.2951503E -01 | 0.2523686E -01  | 0.3868468E -01 | 139.279 | 19.897  | 0.008367 | 7  | 28.455    |
| -0.1199191E -01 | 0.2833717E -01  | 0.3377013E -01 | 112.938 | 14.117  | 0.006655 | 8  | 32.520    |
| 0.1170071E -01  | -0.4836135E -02 | 0.1266075E -01 | 337.544 | 37.505  | 0.002738 | 9  | 36.585    |
| -0.6025512E -02 | -0.1824723E -02 | 0.6235744E -02 | 196.848 | 19.685  | 0.001362 | 10 | 40.650    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.4332557E 04 |                |               |         |         |          |    |           |
| -0.1176579E 06 | 0.1222863E 06  | 0.1637254E 06 | 133.905 | 133.905 | 1.000000 | 1  | 4.065     |
| -0.2346025E 04 | 0.9579335E 02  | 0.2347780E 04 | 177.662 | 88.831  | 0.013834 | 2  | 8.130     |
| -0.1337659E 05 | -0.2673486E 05 | 0.2947453E 05 | 243.419 | 61.140  | 0.176135 | 3  | 12.195    |
| 0.7946745E 03  | 0.1203505E 04  | 0.1445008E 04 | 50.399  | 14.100  | 0.008514 | 4  | 16.260    |
| 0.7353074E 04  | 0.4455008E 04  | 0.8618164E 04 | 31.438  | 6.288   | 0.050777 | 5  | 20.325    |
| -0.6352742E 03 | -0.1652925E 03 | 0.6374443E 03 | 194.922 | 32.487  | 0.003874 | 6  | 24.390    |
| -0.2687029E 04 | 0.1261407E 04  | 0.2403371E 04 | 154.853 | 22.112  | 0.017489 | 7  | 28.455    |
| 0.5213220E 03  | 0.1389325E 04  | 0.1453914E 04 | 69.432  | 8.679   | 0.008743 | 8  | 32.520    |
| 0.1432133E 04  | 0.1835176E 04  | 0.2327343E 04 | 52.032  | 5.781   | 0.013715 | 9  | 36.585    |
| 0.4444043E 03  | 0.3174344E 03  | 0.5405417E 03 | 35.508  | 3.551   | 0.003220 | 10 | 40.650    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2904353E 03 |                |               |         |         |          |    |           |
| -0.1702506E 03 | -0.1355203E 02 | 0.1737871E 03 | 184.551 | 184.551 | 0.497565 | 1  | 4.065     |
| 0.2245436E 03  | -0.2546160E 03 | 0.3432479E 03 | 310.857 | 155.428 | 1.000000 | 2  | 8.130     |
| -0.6034066E 02 | -0.2450976E 03 | 0.2524313E 03 | 250.155 | 62.539  | 0.735416 | 3  | 12.195    |
| -0.6689744E 01 | -0.4491972E 02 | 0.4491513E 02 | 261.529 | 65.382  | 0.132309 | 4  | 16.260    |
| -0.2096268E 02 | -0.4910136E 02 | 0.5338643E 02 | 240.881 | 49.376  | 0.155540 | 5  | 20.325    |
| -0.2403516E 02 | 0.4504619E 02  | 0.3138740E 02 | 118.146 | 19.691  | 0.148835 | 6  | 24.390    |
| 0.1243486E 02  | -0.2180157E 02 | 0.2539453E 02 | 299.699 | 42.814  | 0.073120 | 7  | 28.455    |
| -0.3455876E 01 | -0.2612773E 02 | 0.2833423E 02 | 262.995 | 32.874  | 0.082562 | 8  | 32.520    |
| -0.9532016E 01 | -0.1575161E 00 | 0.9533321E 01 | 180.949 | 20.105  | 0.027774 | 9  | 36.585    |
| 0.1220164E 00  | -0.1860057E 02 | 0.1353077E 02 | 270.376 | 27.038  | 0.054191 | 10 | 40.650    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2303542E 05 |                |               |         |         |          |    |           |
| -0.2624782E 05 | 0.2565275E 05  | 0.3455411E 05 | 131.568 | 131.568 | 1.000000 | 1  | 4.065     |
| 0.8455537E 03  | -0.1137541E 05 | 0.1141361E 05 | 274.501 | 137.251 | 0.287849 | 2  | 8.130     |
| 0.2162781E 04  | -0.5555227E 04 | 0.5774331E 04 | 244.055 | 85.018  | 0.151241 | 3  | 12.195    |
| -0.3540420E 03 | -0.1224615E 04 | 0.1276174E 04 | 253.658 | 63.414  | 0.032199 | 4  | 16.260    |
| 0.1251713E 04  | -0.3371475E 03 | 0.1336143E 04 | 343.400 | 68.680  | 0.032455 | 5  | 20.325    |
| 0.3775557E 03  | -0.2247074E 02 | 0.3742617E 03 | 356.594 | 54.432  | 0.009544 | 6  | 24.390    |
| -0.8734685E 03 | 0.3705405E 03  | 0.7483320E 03 | 157.013 | 22.430  | 0.023940 | 7  | 28.455    |
| 0.6762711E 03  | -0.7631414E 03 | 0.1334634E 04 | 310.809 | 38.851  | 0.026106 | 8  | 32.520    |
| 0.2369537E 03  | 0.3525820E 03  | 0.4049525E 03 | 59.584  | 6.620   | 0.010316 | 9  | 36.585    |
| -0.2900584E 03 | 0.6874202E 02  | 0.2900493E 03 | 160.667 | 16.667  | 0.007521 | 10 | 40.650    |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 4 V= 163.5 KTS n= 1 g

FIXED HUB CHORD AT STA 18  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 3

| AJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| 0.2742519E 05  |                |               |         |         |           |    |           |
| -0.2062136E 04 | 0.8380719E 05  | 0.3383256E 05 | 91.410  | 91.410  | 1.0000000 | 1  | 4.065     |
| 0.4221754E 04  | -0.6204246E 04 | 0.1111650E 05 | 326.068 | 163.034 | 0.132580  | 2  | 8.130     |
| -0.8804500E 04 | -0.1065940E 05 | 0.1382540E 05 | 230.444 | 76.815  | 0.164917  | 3  | 12.195    |
| -0.3940864E 03 | 0.1148447E 04  | 0.1210971E 04 | 108.442 | 27.123  | 0.014445  | 4  | 16.260    |
| 0.2103227E 04  | 0.1005123E 04  | 0.2331038E 04 | 25.543  | 5.109   | 0.027606  | 5  | 20.325    |
| 0.3235566E 03  | -0.1658112E 03 | 0.3731117E 03 | 330.132 | 55.022  | 0.004451  | 6  | 24.390    |
| 0.9171553E 03  | 0.5511892E 03  | 0.1059375E 04 | 30.078  | 4.297   | 0.012643  | 7  | 28.455    |
| 0.2341224E 03  | -0.1625343E 04 | 0.1642173E 04 | 278.197 | 34.775  | 0.019589  | 8  | 32.520    |
| -0.4854192E 03 | -0.1157387E 04 | 0.1255060E 04 | 247.246 | 27.472  | 0.014971  | 9  | 36.585    |
| 0.8157581E 03  | 0.2435837E 03  | 0.2536313E 03 | 19.168  | 1.917   | 0.010302  | 10 | 40.650    |

BLADE FLAP AT STA 130.5  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 19

| AJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| 0.1218521E 05  |                |               |         |         |           |    |           |
| 0.1838560E 04  | -0.2562463E 04 | 0.3154217E 04 | 305.654 | 305.654 | 0.682273  | 1  | 4.065     |
| -0.1781731E 04 | 0.4265964E 04  | 0.4623099E 04 | 112.668 | 56.334  | 1.0000000 | 2  | 8.130     |
| 0.6032820E 03  | 0.1465607E 04  | 0.1534406E 04 | 67.627  | 22.542  | 0.344823  | 3  | 12.195    |
| 0.3702407E 03  | 0.1082456E 02  | 0.3733989E 03 | 1.675   | 0.419   | 0.080119  | 4  | 16.260    |
| -0.5790810E 03 | -0.2568025E 02 | 0.5798813E 03 | 182.954 | 36.591  | 0.125421  | 5  | 20.325    |
| -0.4075090E 02 | 0.2082122E 03  | 0.4576195E 03 | 152.936 | 25.489  | 0.058985  | 6  | 24.390    |
| -0.6013379E 02 | -0.2024568E 03 | 0.2153360E 03 | 253.761 | 36.252  | 0.046513  | 7  | 28.455    |
| 0.5730085E 03  | -0.8364095E 01 | 0.5730096E 03 | 359.164 | 44.895  | 0.123958  | 8  | 32.520    |
| -0.2874585E 03 | 0.5840309E 02  | 0.2733706E 03 | 168.517 | 18.724  | 0.063458  | 9  | 36.585    |
| -0.1305431E 03 | -0.1551166E 03 | 0.2027379E 03 | 229.917 | 22.992  | 0.043853  | 10 | 40.650    |

BLADE FLAP AT STA 174  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 50

| AJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| 0.6705056E 03  |                |               |         |         |           |    |           |
| 0.2000502E 04  | -0.4759281E 04 | 0.5279871E 04 | 294.636 | 294.636 | 1.0000000 | 1  | 4.065     |
| -0.1184544E 04 | 0.4193352E 04  | 0.4357555E 04 | 105.779 | 52.890  | 0.825315  | 2  | 8.130     |
| 0.1774489E 04  | 0.3165433E 03  | 0.1402531E 04 | 10.115  | 3.372   | 0.341391  | 3  | 12.195    |
| -0.1843319E 03 | 0.9463717E 02  | 0.2072777E 03 | 152.775 | 38.194  | 0.039262  | 4  | 16.260    |
| 0.2721295E 03  | 0.3039414E 03  | 0.4117321E 03 | 48.625  | 9.725   | 0.077976  | 5  | 20.325    |
| 0.5045511E 02  | 0.3451484E 03  | 0.3498731E 03 | 81.601  | 13.600  | 0.066079  | 6  | 24.390    |
| -0.2486742E 03 | 0.5751704E 03  | 0.6518009E 03 | 117.280 | 16.754  | 0.123422  | 7  | 28.455    |
| -0.2228121E 03 | -0.5289482E 03 | 0.5737012E 03 | 247.157 | 30.895  | 0.106707  | 8  | 32.520    |
| 0.1644506E 03  | -0.6288200E 01 | 0.1646371E 03 | 357.875 | 39.764  | 0.032123  | 9  | 36.585    |
| 0.2338578E 03  | 0.2170683E 03  | 0.3171330E 03 | 42.863  | 4.266   | 0.060430  | 10 | 40.650    |

BLADE FLAP AT STA 205  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 20

| AJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| -0.9597074E 04 |                |               |         |         |           |    |           |
| -0.2077464E 04 | 0.4426141E 04  | 0.4387338E 04 | 115.144 | 115.144 | 1.0000000 | 1  | 4.065     |
| 0.2232118E 04  | -0.2684285E 04 | 0.3471079E 04 | 309.745 | 154.873 | 0.714307  | 2  | 8.130     |
| -0.2394824E 04 | -0.5303300E 03 | 0.2457723E 04 | 192.461 | 64.154  | 0.502661  | 3  | 12.195    |
| 0.1022345E 03  | 0.7895941E 02  | 0.1291781E 03 | 37.680  | 9.420   | 0.020419  | 4  | 16.260    |
| -0.4465427E 03 | -0.1245028E 03 | 0.4615765E 03 | 195.579 | 39.116  | 0.094811  | 5  | 20.325    |
| -0.1033197E 03 | 0.7786907E 02  | 0.1294177E 03 | 143.009 | 23.835  | 0.020469  | 6  | 24.390    |
| 0.7365529E 02  | -0.2420703E 03 | 0.3317107E 03 | 284.523 | 40.646  | 0.061707  | 7  | 28.455    |
| 0.1926544E 03  | 0.1350518E 03  | 0.2354723E 03 | 34.947  | 4.375   | 0.048159  | 8  | 32.520    |
| -0.1671852E 02 | -0.4255310E 02 | 0.3135033E 02 | 251.000 | 27.889  | 0.010502  | 9  | 36.585    |
| -0.1703520E 02 | -0.1461408E 03 | 0.1471104E 02 | 263.351 | 26.335  | 0.030091  | 10 | 40.650    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 4 V= 163.5 KTS n= 1 g

BLADE FLAP AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 4

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2706270E C4 |                |               |         |         |          |    |           |
| -0.6118572F C3 | 0.2457842E C4  | 0.2532835E C4 | 103.979 | 103.979 | 1.000000 | 1  | 4.065     |
| 0.2008119E C4  | -0.1110797E C4 | 0.2294307E C4 | 331.051 | 165.525 | 0.906040 | 2  | 8.130     |
| -0.2459247F C4 | -0.408165CE C3 | 0.2522481E C4 | 183.312 | 63.104  | 0.955907 | 3  | 12.195    |
| -0.1755293E C3 | -0.1271074E C3 | 0.2505527E C3 | 226.829 | 56.707  | 0.101290 | 4  | 16.260    |
| -0.6013506E C3 | -0.1360951E C3 | 0.0102930E C3 | 192.624 | 38.725  | 0.243318 | 5  | 20.325    |
| -0.3031875E C3 | 0.4098602E C3  | 0.5073164E C3 | 126.491 | 21.082  | 0.201281 | 6  | 24.390    |
| -0.4401448E C3 | -0.4020435E C3 | 0.6385711E C3 | 219.019 | 31.288  | 0.252123 | 7  | 28.455    |
| 0.3944055E C3  | -0.2434651E C3 | 0.4915035E C3 | 323.348 | 40.419  | 0.144092 | 8  | 32.520    |
| -0.1364738E C3 | -0.1238660E C3 | 0.1851625E C3 | 221.710 | 24.634  | 0.073599 | 9  | 36.585    |
| -0.1925585E C3 | 0.2310740E C3  | 0.3003042E C3 | 129.803 | 12.960  | 0.118761 | 10 | 40.650    |

BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 26

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.8150621F C3  |                |               |         |         |          |    |           |
| 0.6997500E C3  | -0.2616111E C3 | 0.7470544E C3 | 339.501 | 339.501 | 0.380906 | 1  | 4.065     |
| 0.1322338E C4  | -0.4689092E C3 | 0.1433013E C4 | 340.475 | 170.238 | 0.715366 | 2  | 8.130     |
| -0.1755293E C4 | 0.7144048E C2  | 0.1901255E C4 | 177.898 | 59.299  | 1.000000 | 3  | 12.195    |
| -0.5682285E C3 | -0.3266464E C3 | 0.6554233E C3 | 209.893 | 52.473  | 0.334187 | 4  | 16.260    |
| -0.4731150E C3 | -0.2554517E C3 | 0.5375857E C3 | 208.740 | 41.748  | 0.275123 | 5  | 20.325    |
| -0.2338710E C3 | 0.3352011E C3  | 0.4032747E C3 | 125.709 | 20.951  | 0.208680 | 6  | 24.390    |
| -0.5086855E C3 | 0.6137818E C2  | 0.5124512E C3 | 173.053 | 24.722  | 0.261267 | 7  | 28.455    |
| -0.3203279E C2 | -0.5200352E C3 | 0.5270095E C3 | 266.515 | 33.314  | 0.268710 | 8  | 32.520    |
| -0.8417067E C2 | -0.1479283E C3 | 0.7014835E C3 | 240.360 | 26.707  | 0.066780 | 9  | 36.585    |
| -0.7884526E C2 | 0.1625488E C3  | 0.1536613E C3 | 115.876 | 11.788  | 0.042115 | 10 | 40.650    |

BLADE CHORD AT STA 103

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 17

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2278272E C6  |                |               |         |         |          |    |           |
| -0.2554490E C4 | 0.3537940E C5  | 0.3940217E C5 | 93.712  | 93.712  | 1.000000 | 1  | 4.065     |
| 0.6724078E C4  | -0.3793928E C4 | 0.7720563E C4 | 330.567 | 165.283 | 0.195645 | 2  | 8.130     |
| -0.7814547E C4 | -0.5860617E C4 | 0.9735738E C4 | 216.612 | 72.204  | 0.246703 | 3  | 12.195    |
| -0.3017702E C4 | -0.2744140E C4 | 0.4078327E C4 | 317.718 | 79.430  | 0.103360 | 4  | 16.260    |
| -0.1817316E C4 | 0.6602170E C2  | 0.1818514E C4 | 177.919 | 35.584  | 0.040082 | 5  | 20.325    |
| 0.6277004E C3  | 0.2718922E C2  | 0.6232891E C3 | 2.480   | 0.413   | 0.015921 | 6  | 24.390    |
| -0.1287765E C4 | -0.3760972E C3 | 0.1311551E C4 | 196.261 | 26.040  | 0.033946 | 7  | 28.455    |
| -0.8309712E C3 | -0.1547352E C3 | 0.3533333E C3 | 193.189 | 24.149  | 0.021626 | 8  | 32.520    |
| -0.5471534E C3 | -0.1139063E C2 | 0.5573116E C3 | 181.193 | 20.132  | 0.013869 | 9  | 36.585    |
| 0.1364358E C3  | 0.6843570E C2  | 0.1526374E C3 | 26.638  | 2.664   | 0.003668 | 10 | 40.650    |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1724154E C5  |                |               |         |         |          |    |           |
| -0.1158519E C4 | 0.2367671E C5  | 0.2370555E C5 | 92.802  | 92.802  | 1.000000 | 1  | 4.065     |
| 0.3317544E C4  | -0.4965848E C4 | 0.5372301E C4 | 303.749 | 151.874 | 0.251942 | 2  | 8.130     |
| -0.6895250E C4 | -0.1024496E C4 | 0.6971016E C4 | 168.455 | 62.818  | 0.294073 | 3  | 12.195    |
| 0.2392010E C4  | -0.2385355E C4 | 0.3378111E C4 | 315.080 | 78.770  | 0.142506 | 4  | 16.260    |
| -0.9759200E C3 | 0.7528064E C3  | 0.1257357E C4 | 140.911 | 28.182  | 0.053042 | 5  | 20.325    |
| 0.1030370E C4  | -0.3933418E C3 | 0.1102731E C4 | 339.106 | 56.518  | 0.046526 | 6  | 24.390    |
| -0.3406218E C3 | 0.1526147E C3  | 0.3732435E C3 | 155.865 | 22.266  | 0.015746 | 7  | 28.455    |
| -0.6893328E C3 | 0.4530692E C3  | 0.1313922E C4 | 151.102 | 18.888  | 0.042853 | 8  | 32.520    |
| 0.3030264E C3  | 0.4006344E C2  | 0.3057033E C3 | 7.534   | 0.837   | 0.012496 | 9  | 36.585    |
| -0.7615055E C3 | 0.547405E C3   | 0.8165591E C3 | 158.841 | 15.984  | 0.034447 | 10 | 40.650    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 4 V= 163.5 KTS n= 1 g

BLADE CHORD AT STA 235  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 22

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2134252F 05 |                |               |         |         |          |    |           |
| -0.5200591E 03 | 0.6055411E 04  | 0.6077677E 04 | 94.909  | 94.909  | 1.000000 | 1  | 4.065     |
| 0.9422261E 03  | -0.1029220E 04 | 0.1395335E 04 | 312.474 | 156.237 | 0.229591 | 2  | 8.130     |
| -0.1754090E 04 | -0.8525598E 03 | 0.1755290E 04 | 205.922 | 68.641  | 0.320894 | 3  | 12.195    |
| 0.1063060E 04  | -0.8025933E 03 | 0.1332015E 04 | 322.948 | 60.737  | 0.219164 | 4  | 16.260    |
| -0.7672229F 03 | 0.2358365E 03  | 0.8026619E 03 | 162.913 | 32.583  | 0.132067 | 5  | 20.325    |
| 0.1610445E 03  | -0.4628520E 02 | 0.1675037E 03 | 343.965 | 57.327  | 0.027570 | 6  | 24.390    |
| -0.4763105F 03 | 0.3033760E 03  | 0.3047200E 03 | 147.506 | 21.072  | 0.052917 | 7  | 28.455    |
| -0.1992676F 03 | 0.2243105F 03  | 0.3003373E 03 | 131.617 | 16.452  | 0.049367 | 8  | 32.520    |
| -0.1089713E 03 | 0.2447627E 03  | 0.3142253E 03 | 69.728  | 7.748   | 0.051701 | 9  | 36.585    |
| -0.1170577E 03 | 0.1682856E 03  | 0.2217357E 03 | 121.869 | 12.167  | 0.036479 | 10 | 40.650    |

BLADE TORSION AT STA 131.5  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 367 FLT 481.0 TR 44

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.7502520F 03  |                |               |         |        |          |    |           |
| 0.2569897E 04  | 0.1649014E 04  | 0.3353460E 04 | 32.687  | 32.687 | 1.000000 | 1  | 4.065     |
| -0.9996111E 03 | 0.1757508E 04  | 0.2316769E 04 | 119.383 | 59.691 | 0.660552 | 2  | 8.130     |
| -0.1402210E 02 | 0.3593916E 03  | 0.3596650E 03 | 92.235  | 30.745 | 0.117789 | 3  | 12.195    |
| -0.2713105E 03 | 0.1342414E 01  | 0.2713137E 03 | 179.717 | 44.929 | 0.088854 | 4  | 16.260    |
| 0.6980815E 03  | 0.5041383E 02  | 0.6993994E 03 | 4.131   | 0.826  | 0.229215 | 5  | 20.325    |
| 0.4585010E 02  | -0.2406801E 03 | 0.2492050E 03 | 280.777 | 40.796 | 0.060304 | 6  | 24.390    |
| -0.2204686F 03 | 0.5005352E 03  | 0.3469387E 03 | 113.772 | 16.253 | 0.179121 | 7  | 28.455    |
| 0.3433057E 02  | -0.7534005E 03 | 0.7533623E 03 | 274.125 | 34.266 | 0.247379 | 8  | 32.520    |
| 0.7152254E 02  | 0.3466738E 02  | 0.7940294E 02 | 25.860  | 2.873  | 0.026030 | 9  | 36.585    |
| -0.8572659E 02 | -0.1024449E 02 | 0.8633751E 02 | 166.618 | 18.682 | 0.028275 | 10 | 40.650    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 5 V= 165 KTS n= 1.13 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 31

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.737433JF 01  |                |               |         |         |          | 1  | 4.032     |
| 0.2930340F 01  | -0.3541785F 01 | 0.4556860E 01 | 309.603 | 309.603 | 1.000000 | 1  | 4.032     |
| -0.2551635E 00 | -0.2340738E 00 | 0.3462862E 03 | 222.528 | 111.264 | 0.075331 | 2  | 8.065     |
| -0.8621025E-01 | 0.4087936E-02  | 0.8633711E-01 | 177.265 | 59.395  | 0.018775 | 3  | 12.097    |
| 0.1648138E-01  | -0.6212126E-02 | 0.1761417E-01 | 339.349 | 84.837  | 0.003832 | 4  | 16.125    |
| 0.2457460F-01  | 0.7472724E-02  | 0.2558733E-01 | 16.912  | 3.382   | 0.005588 | 5  | 20.161    |
| 0.5744426E-03  | -0.1465877E-03 | 0.5423877E-03 | 345.686 | 57.614  | 0.000129 | 6  | 24.194    |
| -0.1187033F-01 | 0.2144195E-01  | 0.2453877E-01 | 118.969 | 16.396  | 0.005332 | 7  | 28.226    |
| 0.3404048E-02  | 0.1307512E-01  | 0.1351373E-01 | 75.407  | 9.426   | 0.002939 | 8  | 32.258    |
| -0.3704462E-02 | 0.2270401E-01  | 0.2300034E-01 | 99.279  | 11.031  | 0.005005 | 9  | 36.290    |
| -0.2731933F-02 | -0.1169974E-02 | 0.2933782E-02 | 203.714 | 20.371  | 0.000649 | 10 | 40.323    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.7236477F 04 |                |               |         |         |          | 1  | 4.032     |
| -0.1604231F 06 | 0.1200098E 06  | 0.2052744E 06 | 141.414 | 141.414 | 1.000000 | 1  | 4.032     |
| -0.5159661F 03 | 0.4366350E 03  | 0.6759224E 03 | 139.761 | 69.880  | 0.003293 | 2  | 8.065     |
| -0.1837528E 05 | -0.2726478E 05 | 0.3243142E 05 | 236.015 | 78.672  | 0.160206 | 3  | 12.097    |
| 0.4806543E 03  | 0.3371376E 04  | 0.3436462E 04 | 81.888  | 20.472  | 0.016597 | 4  | 16.125    |
| 0.6090012F 04  | 0.5603805E 04  | 0.3275922E 04 | 42.619  | 8.524   | 0.040322 | 5  | 20.161    |
| -0.3174020F 03 | 0.1240107E 04  | 0.1233236E 04 | 104.378 | 17.396  | 0.006237 | 6  | 24.194    |
| -0.2540760E 04 | 0.1335634E 04  | 0.2670457E 04 | 152.270 | 21.753  | 0.013786 | 7  | 28.226    |
| 0.5355164F 03  | 0.9072345F 03  | 0.1053194E 04 | 54.448  | 7.431   | 0.005133 | 8  | 32.258    |
| -0.1352250E 03 | 0.1335860E 04  | 0.1326913E 04 | 95.762  | 10.642  | 0.006542 | 9  | 36.290    |
| 0.1343462E 04  | 0.6003228E 03  | 0.1476937E 04 | 76.174  | 2.517   | 0.007294 | 10 | 40.323    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.3976026E 03 |                |               |         |         |          | 1  | 4.032     |
| -0.1106162E 03 | -0.7117502E 02 | 0.1315364E 03 | 212.759 | 212.759 | 0.358558 | 1  | 4.032     |
| 0.2503541E 03  | -0.2681052E 03 | 0.3669481E 03 | 313.043 | 156.522 | 1.000000 | 2  | 8.065     |
| -0.9422803E 02 | -0.2231927E 03 | 0.2422033E 03 | 247.111 | 82.370  | 0.660405 | 3  | 12.097    |
| -0.3111604E 02 | -0.4092106F 02 | 0.5140832E 02 | 232.751 | 58.188  | 0.140134 | 4  | 16.125    |
| -0.3280701E 02 | -0.4575165F 02 | 0.3529433E 02 | 234.357 | 46.371  | 0.153465 | 5  | 20.161    |
| -0.2355759E 02 | 0.5110332E 02  | 0.3844311E 02 | 119.197 | 19.366  | 0.159577 | 6  | 24.194    |
| 0.3495482F 01  | -0.2714778F 02 | 0.2747591E 02 | 278.159 | 39.737  | 0.074897 | 7  | 28.226    |
| 0.7401424E 01  | -0.1902002E 02 | 0.2043736E 02 | 291.263 | 30.408  | 0.055634 | 8  | 32.258    |
| -0.7304387F 01 | 0.6656149E 01  | 0.9445753E 01 | 137.676 | 15.298  | 0.026948 | 9  | 36.290    |
| 0.2314654E 01  | -0.1443658E 02 | 0.1462332E 02 | 279.109 | 27.911  | 0.039856 | 10 | 40.323    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2195447E 05 |                |               |         |         |          | 1  | 4.032     |
| -0.3747568E 05 | 0.3010030E 05  | 0.4806733E 05 | 141.229 | 141.229 | 1.000000 | 1  | 4.032     |
| 0.3112144E 04  | -0.1180819F 05 | 0.1221142E 05 | 264.765 | 142.382 | 0.254048 | 2  | 8.065     |
| -0.7615012E 04 | -0.5109348E 04 | 0.5737660E 04 | 242.896 | 80.965  | 0.119409 | 3  | 12.097    |
| -0.1184030E 04 | -0.4001519F 05 | 0.1493373E 04 | 217.397 | 54.349  | 0.031006 | 4  | 16.125    |
| 0.6416923E 03  | -0.8246978F 03 | 0.1043351E 04 | 307.345 | 61.577  | 0.021742 | 5  | 20.161    |
| 0.5877531E 03  | -0.1444612E 03 | 0.6053318E 03 | 346.194 | 57.699  | 0.012594 | 6  | 24.194    |
| -0.8127740F 03 | 0.2316449F 03  | 0.4422103E 03 | 164.094 | 23.442  | 0.017585 | 7  | 28.226    |
| 0.7458538E 03  | -0.8482585E 03 | 0.1123333E 04 | 311.313 | 36.914  | 0.023495 | 8  | 32.258    |
| 0.2748721F 03  | 0.6766103E 01  | 0.2747591E 03 | 1.455   | 0.162   | 0.005720 | 9  | 36.290    |
| -0.175544E 03  | -0.7750815E 02 | 0.4251311E 03 | 190.513 | 19.051  | 0.008844 | 10 | 40.323    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 5 V= 165 KTS n= 1.13 g

FIXED HUB CHORD AT STA 18  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 3

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1766E58E 05  |                | 0.7730938E 05 | 83.512  | 83.512  | 1.000000 | 1  | 4.032     |
| 0.3748E6E 04   | 0.7730938E 05  | 0.1340761E 05 | 157.808 | 157.808 | 0.176605 | 2  | 8.065     |
| 0.993754E 04   | -0.9724281E 04 | 0.1533979E 05 | 225.386 | 75.129  | 0.203418 | 3  | 12.097    |
| -0.1112478E 05 | -0.1127526E 05 | 0.3417205E 03 | 101.404 | 25.351  | 0.010812 | 4  | 16.125    |
| -0.1064252E 03 | 0.8253029E 03  | 0.1066834E 04 | 30.114  | 6.023   | 0.023975 | 5  | 20.161    |
| 0.1614481E 04  | 0.9366465E 03  | 0.8833328E 03 | 350.880 | 58.480  | 0.011350 | 6  | 24.194    |
| 0.8720542E 03  | -0.1400930E 03 | 0.9247160E 03 | 36.257  | 5.465   | 0.011878 | 7  | 28.226    |
| 0.7262654E 03  | 0.5726448E 03  | 0.9753177E 03 | 275.991 | 34.449  | 0.012525 | 8  | 32.258    |
| 0.1316044E 03  | -0.5644902E 03 | 0.2636252E 03 | 176.037 | 19.560  | 0.003347 | 9  | 36.290    |
| -0.2000020E 03 | 0.1801427E 02  | 0.5475243E 03 | 41.310  | 4.131   | 0.000333 | 10 | 40.323    |
| 0.4113496E 03  | 0.3615024E 03  |               |         |         |          |    |           |

BLADE FLAP AT STA 130.5  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 19

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1354514E 05  |                | 0.3212732E 04 | 300.073 | 300.073 | 0.609552 | 1  | 4.032     |
| 0.1609510E 04  | -0.2780282E 04 | 0.5270630E 04 | 114.164 | 57.082  | 1.000000 | 2  | 8.065     |
| -0.2157525E 04 | 0.4604803E 04  | 0.1303732E 04 | 64.335  | 21.445  | 0.343358 | 3  | 12.097    |
| 0.7617549E 03  | 0.1631143E 04  | 0.0177573E 03 | 11.805  | 2.951   | 0.117624 | 4  | 16.125    |
| 0.6068455E 03  | 0.1268237E 03  | 0.3753735E 03 | 201.374 | 40.275  | 0.071217 | 5  | 20.161    |
| -0.3445549E 03 | -0.1368057E 03 | 0.3817043E 03 | 158.656 | 26.443  | 0.072458 | 6  | 24.194    |
| -0.3357104E 03 | 0.1390014E 03  | 0.2519003E 03 | 229.271 | 32.753  | 0.047794 | 7  | 28.226    |
| -0.1643644E 03 | -0.1508956E 03 | 0.6143542E 03 | 353.873 | 44.234  | 0.116504 | 8  | 32.258    |
| 0.6105464E 03  | 0.8555861E 02  | 0.1545743E 03 | 144.456 | 16.051  | 0.024327 | 9  | 36.290    |
| -0.1257720E 03 | 0.8555861E 02  | 0.1452675E 03 | 254.238 | 25.924  | 0.027722 | 10 | 40.323    |
| -0.2731195E 02 | -0.1436971E 03 |               |         |         |          |    |           |

BLADE FLAP AT STA 174  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 50

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.8166270E 03  |                | 0.5575036E 04 | 293.455 | 293.455 | 1.000000 | 1  | 4.032     |
| 0.2219078E 04  | -0.5114418E 04 | 0.5037735E 04 | 102.875 | 51.438  | 0.903610 | 2  | 8.065     |
| -0.1122523E 04 | 0.4911051E 04  | 0.1936136E 04 | 10.530  | 3.510   | 0.341938 | 3  | 12.097    |
| 0.1874231E 04  | 0.3483850E 03  | 0.3332771E 03 | 179.440 | 44.860  | 0.059780 | 4  | 16.125    |
| -0.3332612E 03 | 0.3254560E 01  | 0.2620542E 03 | 67.609  | 13.522  | 0.047005 | 5  | 20.161    |
| 0.9982204E 02  | 0.2422974E 03  | 0.4216937E 03 | 103.752 | 17.292  | 0.075640 | 6  | 24.194    |
| -0.1002470E 03 | 0.4056049E 03  | 0.7784425E 03 | 111.874 | 15.982  | 0.139629 | 7  | 28.226    |
| -0.2400171E 03 | 0.7224009E 03  | 0.6371772E 03 | 241.276 | 30.154  | 0.117878 | 8  | 32.258    |
| -0.3158239E 03 | -0.5763066E 03 | 0.1859172E 03 | 16.074  | 1.766   | 0.033348 | 9  | 36.290    |
| 0.1736451E 03  | 0.5147546E 02  | 0.3471108E 03 | 61.990  | 6.199   | 0.062620 | 10 | 40.323    |
| 0.1639526E 03  | 0.3682175E 03  |               |         |         |          |    |           |

BLADE FLAP AT STA 205  
HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 20

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1028E6E 05  |                | 0.5038382E 04 | 115.367 | 115.367 | 1.000000 | 1  | 4.032     |
| -0.2415674E 04 | 0.5054414E 04  | 0.4935138E 04 | 305.164 | 152.585 | 0.715816 | 2  | 8.065     |
| 0.2324618E 04  | -0.3259338E 04 | 0.2387503E 04 | 178.305 | 66.102  | 0.458903 | 3  | 12.097    |
| -0.2450624E 04 | 0.6120805E 03  | 0.3375311E 03 | 45.815  | 11.454  | 0.059882 | 4  | 16.125    |
| 0.2353330E 03  | -0.2421244E 03 | 0.2335277E 03 | 229.781 | 45.756  | 0.040937 | 5  | 20.161    |
| -0.1521023E 03 | -0.1726273E 03 | 0.3470535E 02 | 240.032 | 40.105  | 0.006201 | 6  | 24.194    |
| -0.1714459E 02 | -0.3047054E 02 | 0.3116335E 03 | 284.967 | 40.710  | 0.076467 | 7  | 28.226    |
| 0.1113567E 03  | -0.4165378E 03 | 0.1544077E 03 | 50.634  | 6.354   | 0.027345 | 8  | 32.258    |
| 0.9755615E 02  | 0.1157620E 03  | 0.5131750E 02 | 66.948  | 7.444   | 0.009048 | 9  | 36.290    |
| 0.1493603E 02  | 0.4656304E 02  | 0.2112333E 03 | 268.268 | 26.827  | 0.037463 | 10 | 40.323    |
| -0.6183551E 01 | -0.2111418E 03 |               |         |         |          |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 5 V= 165 KTS n= 1.13 g

BLADE FLAP AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 4

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1228502E 04 |                |               |         |         |          | 1  | 4.032     |
| -0.9954331E 03 | 0.3006606E 04  | 0.3163973E 04 | 108.147 | 108.147 | 1.000000 | 2  | 8.065     |
| 0.1364325E 04  | -0.1633035E 04 | 0.2473439E 04 | 318.743 | 159.392 | 0.783321 | 3  | 12.097    |
| -0.2386401E 04 | -0.7302698E 03 | 0.2498027E 04 | 196.998 | 65.666  | 0.789521 | 4  | 16.129    |
| 0.7023670E 02  | -0.5844253E 02 | 0.3171770E 02 | 319.978 | 74.394  | 0.026748 | 5  | 20.161    |
| -0.4391240E 03 | -0.2105609E 03 | 0.4873030E 03 | 203.653 | 41.131  | 0.154016 | 6  | 24.194    |
| -0.2763301E 03 | 0.1466911E 03  | 0.3146201E 03 | 152.209 | 25.368  | 0.059438 | 7  | 28.226    |
| -0.4044204E 03 | -0.1086492E 03 | 0.4193513E 03 | 192.063 | 27.866  | 0.132381 | 8  | 32.258    |
| 0.3546240E 03  | -0.3180012E 03 | 0.5533779E 03 | 320.794 | 40.099  | 0.159002 | 9  | 36.290    |
| -0.1626440E 03 | -0.3163031E 02 | 0.1655911E 03 | 191.005 | 21.223  | 0.052368 | 10 | 40.323    |
| -0.1234570E 03 | 0.2115877E 03  | 0.2452233E 03 | 120.364 | 12.036  | 0.077505 |    |           |

BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 26

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1275874E 04  |                |               |         |         |          | 1  | 4.032     |
| 0.6010325E 03  | 0.2660474E 03  | 0.6572832E 03 | 23.877  | 23.877  | 0.323368 | 2  | 8.065     |
| 0.1094466E 04  | -0.6803406E 03 | 0.1297337E 04 | 328.228 | 164.114 | 0.635677 | 3  | 12.097    |
| -0.2319521E 04 | -0.2303678E 03 | 0.2332617E 04 | 186.508 | 62.169  | 1.000000 | 4  | 16.129    |
| -0.3551304E 03 | -0.2707766E 03 | 0.4465554E 03 | 217.325 | 54.331  | 0.219710 | 5  | 20.161    |
| -0.4370791E 03 | -0.1536919E 03 | 0.4633133E 03 | 199.373 | 39.875  | 0.227939 | 6  | 24.194    |
| -0.2924387E 03 | 0.2716257E 03  | 0.3994917E 03 | 137.162 | 22.360  | 0.196541 | 7  | 28.226    |
| -0.5934270E 03 | -0.1340256E 02 | 0.5935734E 03 | 181.294 | 25.849  | 0.292027 | 8  | 32.258    |
| -0.8532580E 02 | -0.6035823E 03 | 0.5095340E 03 | 261.753 | 32.744  | 0.299901 | 9  | 36.290    |
| -0.8556700E 02 | -0.5531434E 02 | 0.1041177E 03 | 214.732 | 23.859  | 0.051223 | 10 | 40.323    |
| -0.1003165E 03 | 0.1556819E 03  | 0.1856047E 03 | 122.151 | 12.215  | 0.092789 |    |           |

BLADE CHORD AT STA 103

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 17

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2247658E 06  |                |               |         |         |          | 1  | 4.032     |
| 0.3286727E 04  | 0.3637576E 05  | 0.3652394E 05 | 84.837  | 84.837  | 1.000000 | 2  | 8.065     |
| 0.7002098E 04  | -0.6512551E 04 | 0.9302556E 05 | 317.074 | 158.537 | 0.261816 | 3  | 12.097    |
| -0.1057584E 05 | -0.7052852E 04 | 0.1271521E 05 | 213.669 | 71.230  | 0.348134 | 4  | 16.129    |
| 0.3674237E 04  | -0.1354496E 04 | 0.4107034E 04 | 340.753 | 85.188  | 0.112502 | 5  | 20.161    |
| -0.1032015E 04 | -0.6984226E 03 | 0.1247847E 04 | 212.842 | 42.568  | 0.035260 | 6  | 24.194    |
| 0.8218594E 03  | 0.5304980E 03  | 0.1241483E 04 | 48.548  | 8.071   | 0.033991 | 7  | 28.226    |
| -0.3997559E 03 | 0.3194009E 02  | 0.9303223E 03 | 177.967 | 25.424  | 0.024650 | 8  | 32.258    |
| -0.5528220E 03 | -0.6616472E 03 | 0.8623535E 03 | 230.129 | 28.766  | 0.023611 | 9  | 36.290    |
| 0.4547117E 03  | 0.4514773E 03  | 0.5611283E 03 | 44.827  | 4.981   | 0.017554 | 10 | 40.323    |
| 0.3555547E 03  | 0.4756641E 03  | 0.5994661E 03 | 53.145  | 5.314   | 0.016413 |    |           |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1555055E 05  |                |               |         |         |          | 1  | 4.032     |
| 0.1115402E 04  | 0.2184692E 05  | 0.2188639E 05 | 86.554  | 86.554  | 1.000000 | 2  | 8.065     |
| 0.3314449E 04  | -0.7217018E 04 | 0.7912621E 04 | 294.666 | 147.333 | 0.362902 | 3  | 12.097    |
| -0.7905637E 04 | -0.1413117E 04 | 0.9303333E 04 | 190.134 | 63.373  | 0.366938 | 4  | 16.129    |
| 0.2954195E 04  | -0.1635648E 04 | 0.3437593E 04 | 327.893 | 61.773  | 0.159350 | 5  | 20.161    |
| -0.1122744E 04 | 0.3065652E 03  | 0.1154373E 04 | 164.633 | 32.927  | 0.053201 | 6  | 24.194    |
| 0.7034360E 03  | 0.2125085E 02  | 0.7637317E 03 | 1.594   | 0.266   | 0.034645 | 7  | 28.226    |
| -0.4407024E 03 | 0.3228987E 03  | 0.5435532E 03 | 143.770 | 20.533  | 0.024962 | 8  | 32.258    |
| -0.2461844E 03 | 0.3401450E 03  | 0.4148893E 03 | 125.896 | 15.737  | 0.019185 | 9  | 36.290    |
| 0.3635366E 03  | 0.2764225E 03  | 0.4579365E 03 | 37.448  | 4.161   | 0.020922 | 10 | 40.323    |
| 0.5724451E 02  | 0.3544060E 03  | 0.5733366E 03 | 81.742  | 8.174   | 0.018209 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 5 V= 165 KTS n= 1.13 g

BLADE CHORD AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 22  
OVERALL CYCLIC LOAD = 0.922113E C4

ZERO POSITION USED 0.42 LOAD/IN USED -63300.00

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2047505E 03 |                |               |         |         |          |    |           |
| 0.2173795E 03  | 0.5324379E 04  | 0.5324379E 04 | 87.447  | 87.447  | 1.000000 | 1  | 4.032     |
| 0.1061142E 04  | -0.1443926E 04 | 0.1791911E 04 | 306.312 | 153.156 | 0.336214 | 2  | 8.065     |
| -0.2274407E 04 | -0.5737871E 03 | 0.2345068E 04 | 194.159 | 64.720  | 0.440113 | 3  | 12.097    |
| 0.1321380E 04  | -0.7025059E 03 | 0.1495510E 04 | 332.003 | 83.001  | 0.280790 | 4  | 16.127    |
| -0.7006682E 03 | -0.5926355E 02 | 0.7031677E 03 | 184.835 | 36.967  | 0.131935 | 5  | 20.161    |
| 0.3604021E 03  | -0.1367216E 02 | 0.3624072E 03 | 354.670 | 59.112  | 0.060610 | 6  | 24.194    |
| -0.3693545E 03 | 0.1596444E 03  | 0.4203404E 03 | 157.679 | 22.520  | 0.078971 | 7  | 28.226    |
| -0.1167676E 03 | -0.8135046E 02 | 0.1423344E 03 | 214.678 | 26.860  | 0.026706 | 8  | 32.258    |
| 0.2344562E 03  | 0.2602749E 03  | 0.3503306E 03 | 47.983  | 5.331   | 0.065732 | 9  | 36.290    |
| -0.2049720E 03 | 0.1184030E 03  | 0.2357125E 03 | 149.987 | 14.494  | 0.044414 | 10 | 40.323    |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 377 FLT 481.0 TR 44  
OVERALL CYCLIC LOAD = 0.567738E C4

ZERO POSITION USED 1.49 LOAD/IN USED 12530.00

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.6777244E 03  |                |               |         |        |          |    |           |
| 0.2691706E 04  | 0.1712721E 04  | 0.3190406E 04 | 32.468  | 32.468 | 1.000000 | 1  | 4.032     |
| -0.1160976E 04 | 0.1851249E 04  | 0.2185174E 04 | 122.093 | 61.047 | 0.684920 | 2  | 8.065     |
| 0.7611546E 02  | 0.2377963E 03  | 0.2496823E 03 | 72.253  | 24.083 | 0.078260 | 3  | 12.097    |
| -0.2477146E 03 | -0.1114654E 03 | 0.2716377E 03 | 204.227 | 51.057 | 0.085142 | 4  | 16.125    |
| 0.6199238E 03  | 0.3189195E 01  | 0.6199313E 03 | 0.295   | 0.059  | 0.194311 | 5  | 20.161    |
| -0.1089505E 02 | -0.2824558E 03 | 0.2886614E 03 | 267.637 | 44.539 | 0.090478 | 6  | 24.194    |
| -0.1798467E 03 | 0.3857168E 03  | 0.4272131E 03 | 114.772 | 16.396 | 0.134532 | 7  | 28.226    |
| -0.1150871E 03 | -0.7532235E 03 | 0.7619653E 03 | 261.313 | 32.664 | 0.238830 | 8  | 32.258    |
| 0.9855208E 02  | 0.5573621E 02  | 0.1132212E 03 | 29.440  | 3.277  | 0.035468 | 9  | 36.290    |
| -0.6989406E 02 | 0.1256669E 02  | 0.7103662E 02 | 169.490 | 16.949 | 0.022281 | 10 | 40.323    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 6 V= 165.5 KTS n= 1.42 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1007 T 394 CTR 383 FLT 481.0 TR 31

| AJ              | HJ              | CJ             | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|-----------------|-----------------|----------------|---------|---------|----------|----|-----------|
| 0.8397724E 01   | -0.3644401E 01  | 0.4344300E 01  | 306.642 | 306.642 | 1.000000 | 1  | 4.115     |
| 0.2714504E 01   | -0.2854232E 00  | 0.4211034E 00  | 222.764 | 111.382 | 0.092985 | 2  | 8.230     |
| -0.3391534E 00  | 0.2565742E -02  | 0.1140033E 00  | 178.711 | 59.570  | 0.025078 | 3  | 12.346    |
| 0.6449604E -01  | -0.6344473E -01 | 0.4347095E -01 | 315.471 | 76.868  | 0.019891 | 4  | 16.461    |
| -0.1346744E -01 | -0.1253148E -01 | 0.2245019E -01 | 214.235 | 42.857  | 0.005047 | 5  | 20.576    |
| -0.1584057E -01 | 0.5020738E -02  | 0.1827248E -01 | 150.417 | 25.070  | 0.004017 | 6  | 24.691    |
| -0.1417429E -01 | -0.8477144E -02 | 0.1651582E -01 | 210.882 | 30.126  | 0.003631 | 7  | 28.807    |
| -0.1251100E -01 | 0.3622360E -02  | 0.1341035E -01 | 164.329 | 20.541  | 0.002948 | 8  | 32.922    |
| -0.6366212E -02 | -0.5742174E -03 | 0.6342004E -02 | 185.154 | 20.573  | 0.001405 | 9  | 37.037    |
| 0.4667572E -03  | -0.5578503E -02 | 0.5547944E -02 | 274.783 | 27.478  | 0.001231 | 10 | 41.152    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1007 T 394 CTR 383 FLT 481.0 TR 36

| AJ             | HJ              | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|-----------------|---------------|---------|---------|----------|----|-----------|
| -0.4684401E 04 | 0.1343379E 06   | 0.2927471E 06 | 152.685 | 152.685 | 1.000000 | 1  | 4.115     |
| -0.2601042E 06 | 0.1891848E 04   | 0.2212418E 04 | 121.229 | 60.614  | 0.007557 | 2  | 8.230     |
| -0.1147042E 04 | -0.33570174E 05 | 0.4342253E 05 | 226.231 | 75.410  | 0.169165 | 3  | 12.346    |
| -0.3325733E 05 | 0.5135070E 04   | 0.5217905E 04 | 100.227 | 25.057  | 0.017824 | 4  | 16.461    |
| 0.6836040E 03  | 0.8874395E 04   | 0.4333034E 04 | 85.595  | 17.119  | 0.030404 | 5  | 20.576    |
| 0.7304760E 03  | -0.3462152E 02  | 0.1370752E 03 | 352.624 | 58.771  | 0.002518 | 6  | 24.691    |
| -0.3305000E 04 | -0.3452640E 03  | 0.3011417E 03 | 187.568 | 26.795  | 0.010355 | 7  | 28.807    |
| 0.7237620E 03  | 0.4335876E 03   | 0.4437000E 03 | 30.925  | 3.866   | 0.002082 | 8  | 32.922    |
| 0.1161291E 04  | 0.1557581E 04   | 0.1742700E 04 | 53.290  | 5.321   | 0.006037 | 9  | 37.037    |
| 0.5949495E 03  | 0.6362361E 03   | 0.8710644E 03 | 46.921  | 4.392   | 0.002975 | 10 | 41.152    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1007 T 394 CTR 383 FLT 481.0 TR 11

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.4722087E 03 | -0.2901030E 03 | 0.2925413E 03 | 277.403 | 277.403 | 0.643252 | 1  | 4.115     |
| 0.3769156E 02  | -0.3504698E 03 | 0.4557849E 03 | 300.843 | 150.421 | 1.000000 | 2  | 8.230     |
| 0.2331558E 03  | -0.2524711E 03 | 0.3347020E 03 | 227.819 | 75.940  | 0.749151 | 3  | 12.346    |
| -0.2297719E 03 | 0.5053596E 01  | 0.3214437E 02 | 170.383 | 42.721  | 0.070686 | 4  | 16.461    |
| -0.8373127E 02 | -0.2784476E 02 | 0.3365533E 02 | 147.266 | 39.453  | 0.206615 | 5  | 20.576    |
| -0.3212503E 01 | 0.1540040E 02  | 0.1655474E 02 | 104.533 | 17.472  | 0.036181 | 6  | 24.691    |
| -0.3762580E 00 | -0.4204483E 02 | 0.4203531E 02 | 264.498 | 39.498  | 0.042564 | 7  | 28.807    |
| -0.1704114E 02 | -0.9821594E 01 | 0.1405635E 02 | 209.457 | 26.245  | 0.043249 | 8  | 32.922    |
| -0.7044674E 01 | -0.4546420E 01 | 0.4421623E 01 | 212.678 | 23.631  | 0.018518 | 9  | 37.037    |
| -0.1720520E 02 | 0.1365243E 02  | 0.2209209E 02 | 141.167 | 14.117  | 0.048577 | 10 | 41.152    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1007 T 394 CTR 383 FLT 481.0 TR 1

| AJ              | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|-----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.437477E 04   | 0.3010134E 05  | 0.6901800E 05 | 154.142 | 154.142 | 1.000000 | 1  | 4.115     |
| -0.6210754E 05  | -0.1368014E 05 | 0.1387238E 05 | 279.548 | 139.774 | 0.200996 | 2  | 8.230     |
| 0.2301125E 04   | -0.5207562E 04 | 0.7213523E 04 | 226.217 | 75.406  | 0.164509 | 3  | 12.346    |
| -0.49490671E 04 | -0.6447183E 03 | 0.1776713E 04 | 200.361 | 50.090  | 0.028930 | 4  | 16.461    |
| -0.1871459E 04  | 0.5320892E 02  | 0.1444373E 04 | 177.889 | 35.578  | 0.020427 | 5  | 20.576    |
| -0.1443332E 04  | 0.4175754E 03  | 0.3783970E 03 | 55.702  | 9.264   | 0.006376 | 6  | 24.691    |
| 0.3257573E 03   | 0.2243437E 03  | 0.3717422E 03 | 152.410 | 21.773  | 0.008270 | 7  | 28.807    |
| -0.5056624E 03  | -0.2733536E 03 | 0.3821424E 03 | 313.905 | 39.238  | 0.005537 | 8  | 32.922    |
| 0.2050003E 03   | 0.2498544E 02  | 0.335342E 03  | 4.417   | 0.491   | 0.013092 | 9  | 37.037    |
| 0.6659174E 02   | -0.2523225E 02 | 0.7272537E 02 | 336.300 | 33.630  | 0.001054 | 10 | 41.152    |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 6 V= 165.5 KTS n= 1.42 g

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 383 FLT 481.0 TR 3

| AJ              | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|-----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1868164E 05   |                |               |         |         |          |    |           |
| 0.43113014F 05  | 0.2123829F 05  | 0.4407575E 05 | 26.217  | 26.217  | 1.000000 | 1  | 4.115     |
| 0.2574204F 05   | -0.2560847E 05 | 0.3631151E 05 | 315.150 | 157.575 | 0.755298 | 2  | 8.230     |
| -0.1515564E 05  | -0.1761718F 05 | 0.2323117E 05 | 229.295 | 76.432  | 0.483387 | 3  | 12.346    |
| 0.1342623F 03   | 0.9540317F 03  | 0.9534255E 03 | 81.993  | 20.548  | 0.020040 | 4  | 16.461    |
| -0.4386032E 02  | -0.2224505E 02 | 0.4413357E 02 | 206.889 | 41.378  | 0.001023 | 5  | 20.576    |
| -0.41300337E 03 | -0.1331048E 04 | 0.1613250E 04 | 235.660 | 39.277  | 0.033556 | 6  | 24.691    |
| 0.1052504E 03   | 0.9642637E 03  | 0.9747517E 03 | 83.917  | 11.988  | 0.020275 | 7  | 28.807    |
| 0.3197622E 03   | -0.5763750E 03 | 0.6572335E 03 | 299.037 | 31.380  | 0.013713 | 8  | 32.922    |
| 0.1114366E 04   | -0.1476048F 04 | 0.1854557E 04 | 307.126 | 34.125  | 0.038576 | 9  | 37.037    |
| 0.1501568E 03   | -0.6776335F 03 | 0.6747704E 03 | 282.494 | 28.249  | 0.014437 | 10 | 41.152    |

BLADE FLAP AT STA 130.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 383 FLT 481.0 TR 19

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1494232E 05  |                |               |         |         |          |    |           |
| 0.6134570E 03  | -0.3639529F 04 | 0.3670857E 04 | 279.567 | 279.567 | 0.535130 | 1  | 4.115     |
| -0.2899627F 04 | 0.6258038E 04  | 0.6577137E 04 | 114.861 | 57.430  | 1.000000 | 2  | 8.230     |
| 0.1249596F 04  | 0.1534225E 04  | 0.2302933E 04 | 57.127  | 19.042  | 0.333904 | 3  | 12.346    |
| 0.7345181E 03  | 0.1444320E 03  | 0.7534702E 03 | 11.051  | 2.763   | 0.109247 | 4  | 16.461    |
| 0.8364551E 02  | -0.5813767F 03 | 0.5459435E 03 | 277.897 | 55.579  | 0.085100 | 5  | 20.576    |
| 0.9519878E 02  | -0.3653444E 02 | 0.4362355E 02 | 337.028 | 56.171  | 0.013574 | 6  | 24.691    |
| -0.1146571E 03 | -0.4674097F 03 | 0.5014821E 03 | 256.207 | 36.601  | 0.072767 | 7  | 28.807    |
| 0.3427080E 03  | -0.1393132E 03 | 0.3679417E 03 | 337.878 | 42.235  | 0.055637 | 8  | 32.922    |
| -0.1204672F 03 | -0.3057019F 02 | 0.1247702E 03 | 194.183 | 21.570  | 0.018090 | 9  | 37.037    |
| -0.1630658E 02 | -0.6499049E 02 | 0.6730435E 02 | 255.915 | 25.591  | 0.009715 | 10 | 41.152    |

BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 383 FLT 481.0 TR 50

| AJ             | BJ             | CJ             | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|----------------|---------|---------|----------|----|-----------|
| 0.13000167E 04 |                |                |         |         |          |    |           |
| 0.2214841F 04  | -0.5870227E 04 | 0.6272375E 04  | 290.607 | 290.607 | 0.956667 | 1  | 4.115     |
| -0.1631553F 04 | 0.6372504E 04  | 0.6578351E 04  | 104.361 | 52.181  | 1.000000 | 2  | 8.230     |
| 0.2187749F 04  | 0.4714304F 03  | 0.2237526E 04  | 12.163  | 4.054   | 0.340150 | 3  | 12.346    |
| -0.4456304E 03 | 0.1791822E 03  | 0.44833047E 03 | 158.096 | 39.524  | 0.073016 | 4  | 16.461    |
| -0.1507833F 03 | 0.4570330F 03  | 0.4312637E 03  | 108.259 | 21.652  | 0.073162 | 5  | 20.576    |
| -0.3469473F 03 | 0.4219205F 03  | 0.3452355E 03  | 129.431 | 21.572  | 0.023041 | 6  | 24.691    |
| -0.1716775E 03 | 0.4656345F 03  | 0.4762775E 03  | 110.259 | 15.748  | 0.075445 | 7  | 28.807    |
| -0.8397955F 02 | -0.3576370E 03 | 0.3573505E 03  | 256.785 | 32.099  | 0.055847 | 8  | 32.922    |
| 0.5615576F 02  | -0.1116544E 03 | 0.1231574E 03  | 296.659 | 32.962  | 0.019027 | 9  | 37.037    |
| 0.3273201E 02  | -0.6616714F 02 | 0.6659417E 02  | 292.210 | 29.221  | 0.013164 | 10 | 41.152    |

BLADE FLAP AT STA 205

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 383 FLT 481.0 TR 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.4045844F 04 |                |               |         |         |          |    |           |
| -0.2414713F 04 | 0.5755461E 04  | 0.6497133E 04 | 116.699 | 116.699 | 1.000000 | 1  | 4.115     |
| 0.2412044E 04  | -0.4763844E 04 | 0.5554277E 04 | 300.417 | 150.208 | 0.856202 | 2  | 8.230     |
| -0.2170566F 04 | -0.6047213F 03 | 0.2314933E 04 | 200.342 | 66.781  | 0.356350 | 3  | 12.346    |
| 0.6557803E 03  | -0.3869560E 02 | 0.6567237E 03 | 356.623 | 89.156  | 0.101265 | 4  | 16.461    |
| 0.2612412E 03  | -0.4514231F 03 | 0.4215047E 03 | 300.058 | 60.012  | 0.080400 | 5  | 20.576    |
| 0.3101600E 03  | -0.3559244E 02 | 0.3122014E 03 | 353.434 | 58.909  | 0.048126 | 6  | 24.691    |
| 0.1444434F 03  | -0.3567444E 03 | 0.4222136E 03 | 290.003 | 41.429  | 0.065085 | 7  | 28.807    |
| 0.4855550E 02  | -0.2721787F 01 | 0.4303171E 02 | 350.792 | 44.549  | 0.007497 | 8  | 32.922    |
| -0.1555635E 02 | 0.2599213F 02  | 0.3029105E 02 | 120.401 | 13.433  | 0.004670 | 9  | 37.037    |
| -0.7413411F 02 | -0.3361342E 01 | 0.7421034E 02 | 182.546 | 18.260  | 0.011440 | 10 | 41.152    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 6 V= 165.5 KTS n= 1.42 g

BLADE FLAP AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 383 FLT 481.0 TR 4

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1798116E 03  |                |               |         |         |          |    |           |
| -0.151705E 04  | 0.3823149E 04  | 0.4113352E 04 | 111.649 | 111.649 | 1.000000 | 1  | 4.115     |
| 0.2252740E 04  | -0.2747943E 04 | 0.3554822E 04 | 309.324 | 154.662 | 0.864224 | 2  | 8.230     |
| -0.1459794E 04 | -0.8036518E 03 | 0.2020036E 04 | 203.375 | 67.742  | 0.452563 | 3  | 12.346    |
| 0.6382724E 03  | -0.2663635E 03 | 0.6643374E 03 | 336.351 | 64.088  | 0.161435 | 4  | 16.461    |
| -0.1037097E 03 | -0.6406762E 03 | 0.6473065E 03 | 261.447 | 52.267  | 0.169848 | 5  | 20.576    |
| -0.1093443E 03 | -0.2157054E 03 | 0.2455707E 03 | 243.562 | 40.594  | 0.059706 | 6  | 24.691    |
| -0.3337609E 03 | -0.3610488E 03 | 0.4951157E 03 | 226.821 | 32.403  | 0.120368 | 7  | 28.807    |
| 0.3075774E 03  | -0.175447E 03  | 0.3543335E 03 | 330.232 | 41.279  | 0.066143 | 8  | 32.922    |
| -0.116440E 03  | -0.2600081E 03 | 0.2847082E 03 | 294.132 | 32.081  | 0.069264 | 9  | 37.037    |
| -0.7448354E 02 | 0.9673508E 02  | 0.1207557E 03 | 131.397 | 13.140  | 0.029406 | 10 | 41.152    |

BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 383 FLT 481.0 TR 26

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2674787E 04  |                |               |         |         |          |    |           |
| 0.2531043E 03  | 0.1016474E 04  | 0.1047511E 04 | 76.018  | 76.018  | 0.552019 | 1  | 4.115     |
| 0.1516672E 03  | -0.1140435E 04 | 0.1897003E 04 | 323.059 | 161.530 | 1.000000 | 2  | 8.230     |
| -0.1413531E 04 | -0.4388145E 03 | 0.1410739E 04 | 197.242 | 65.747  | 0.780175 | 3  | 12.346    |
| 0.8680240E 02  | -0.4776833E 03 | 0.4855073E 03 | 280.299 | 70.075  | 0.255854 | 4  | 16.461    |
| -0.2004555E 03 | -0.4136590E 03 | 0.4597356E 03 | 244.148 | 46.830  | 0.242256 | 5  | 20.576    |
| -0.4734778E 03 | 0.1762276E 03  | 0.5078357E 03 | 160.416 | 26.736  | 0.267631 | 6  | 24.691    |
| -0.4166570E 03 | -0.2284357E 03 | 0.4751572E 03 | 208.734 | 27.919  | 0.250405 | 7  | 28.807    |
| 0.9330191E 01  | -0.4640046E 03 | 0.4640777E 03 | 271.148 | 33.694  | 0.244571 | 8  | 32.922    |
| -0.5121597E 02 | -0.2764875E 03 | 0.2355513E 03 | 257.544 | 28.844  | 0.149426 | 9  | 37.037    |
| 0.1563571E 02  | -0.6440629E 01 | 0.1691397E 02 | 337.617 | 33.762  | 0.006913 | 10 | 41.152    |

BLADE CHORD AT STA 103

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 383 FLT 481.0 TR 17

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2265564E 06  |                |               |         |         |          |    |           |
| 0.2295322E 05  | 0.7140785E 04  | 0.2403832E 05 | 17.281  | 17.281  | 1.000000 | 1  | 4.115     |
| 0.1580267E 05  | -0.1725118E 05 | 0.2554077E 05 | 312.468 | 156.234 | 0.975142 | 2  | 8.230     |
| -0.1765505E 05 | -0.9439649E 04 | 0.2002020E 05 | 208.132 | 69.377  | 0.632645 | 3  | 12.346    |
| 0.4443555E 04  | 0.2444912E 03  | 0.4443555E 04 | 3.792   | 3.792   | 0.165238 | 4  | 16.461    |
| -0.1340470E 04 | 0.7356269E 03  | 0.1943391E 04 | 158.116 | 31.623  | 0.082510 | 5  | 20.576    |
| -0.4964032E 03 | 0.4660170E 03  | 0.1071034E 04 | 154.104 | 25.684  | 0.044580 | 6  | 24.691    |
| -0.1843540E 04 | -0.7425644E 02 | 0.1335243E 04 | 182.397 | 26.057  | 0.078843 | 7  | 28.807    |
| -0.9875476E 03 | -0.1652865E 03 | 0.3931641E 03 | 186.085 | 23.261  | 0.041516 | 8  | 32.922    |
| 0.4100075E 03  | 0.7604885E 03  | 0.3323713E 03 | 62.301  | 6.922   | 0.036694 | 9  | 37.037    |
| -0.1656614E 03 | -0.7422005E 03 | 0.4043377E 03 | 258.174 | 25.617  | 0.033671 | 10 | 41.152    |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 383 FLT 481.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1628465E 05  |                |               |         |         |          |    |           |
| 0.7502965E 04  | 0.7157039E 04  | 0.1039674E 05 | 43.808  | 43.808  | 0.612725 | 1  | 4.115     |
| 0.9391563E 04  | -0.1433316E 05 | 0.1646804E 05 | 302.358 | 151.179 | 1.000000 | 2  | 8.230     |
| -0.1232274E 05 | -0.2247088E 04 | 0.1331913E 05 | 189.939 | 63.313  | 0.767274 | 3  | 12.346    |
| 0.4047274E 04  | -0.8073025E 03 | 0.4127033E 04 | 348.719 | 87.180  | 0.243222 | 4  | 16.461    |
| -0.1186621E 04 | 0.2101615E 04  | 0.2413651E 04 | 119.448 | 23.690  | 0.142247 | 5  | 20.576    |
| 0.3310352E 03  | 0.1111822E 04  | 0.1161774E 04 | 73.448  | 12.241  | 0.068480 | 6  | 24.691    |
| -0.1804575E 04 | 0.1107915E 04  | 0.2117533E 04 | 148.452 | 21.207  | 0.124796 | 7  | 28.807    |
| -0.4301787E 03 | 0.1400041E 04  | 0.1464639E 04 | 107.080 | 13.365  | 0.086317 | 8  | 32.922    |
| -0.5545679E 02 | 0.1376148E 04  | 0.1377267E 04 | 92.310  | 10.257  | 0.081168 | 9  | 37.037    |
| 0.3934185E 03  | 0.2960992E 02  | 0.3930342E 03 | 4.307   | 0.431   | 0.023281 | 10 | 41.152    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 6 V= 165.5 KTS n= 1.42 g

## BLADE CHORD AT STA 235

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 383 FLT 481.0 TR 22

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2074012E 05 |                |               |         |         |          |    |           |
| 0.2373545E 04  | 0.8881917E 03  | 0.2533958E 04 | 20.471  | 20.471  | 0.544785 | 1  | 4.115     |
| 0.3323520E 04  | -0.3313825E 04 | 0.4051331E 04 | 314.565 | 157.283 | 1.000000 | 2  | 8.230     |
| -0.3378707E 04 | -0.1387433E 04 | 0.4117402E 04 | 199.683 | 66.561  | 0.885645 | 3  | 12.346    |
| 0.1323184E 04  | -0.2844202E 03 | 0.1333881E 04 | 347.873 | 80.968  | 0.291076 | 4  | 16.461    |
| -0.8292524E 03 | 0.5487117E 03  | 0.1250045E 04 | 131.156 | 26.231  | 0.270902 | 5  | 20.576    |
| 0.1641566E 03  | 0.4340331E 03  | 0.4632810E 03 | 67.525  | 11.587  | 0.100892 | 6  | 24.691    |
| -0.8919492E 03 | 0.1201515E 02  | 0.3723330E 03 | 177.228 | 25.304  | 0.141781 | 7  | 28.807    |
| -0.3317458E 03 | 0.5116387E 03  | 0.5737705E 03 | 120.531 | 15.066  | 0.127704 | 8  | 32.922    |
| -0.6420074E 02 | 0.6117351E 03  | 0.6158367E 03 | 96.454  | 10.717  | 0.132358 | 9  | 37.037    |
| -0.2786490E 02 | -0.1482308E 03 | 0.1503271E 03 | 259.354 | 25.935  | 0.032427 | 10 | 41.152    |

## BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 383 FLT 481.0 TR 44

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1955211E 03  |                |               |         |         |          |    |           |
| 0.2974366E 04  | 0.2825078E 04  | 0.4102184E 04 | 43.525  | 43.525  | 1.000000 | 1  | 4.115     |
| -0.5601162E 03 | 0.2430096E 04  | 0.2501603E 04 | 102.938 | 51.469  | 0.609824 | 2  | 8.230     |
| 0.5391245E 03  | -0.2907742E 03 | 0.0569754E 03 | 333.730 | 111.243 | 0.160153 | 3  | 12.346    |
| -0.9128149E 03 | -0.3486914E 03 | 0.9704351E 03 | 200.797 | 50.199  | 0.238028 | 4  | 16.461    |
| 0.1351772E 03  | 0.7079634E 03  | 0.7161002E 03 | 81.312  | 16.262  | 0.174585 | 5  | 20.576    |
| -0.2081116E 03 | 0.2429530E 03  | 0.3194187E 03 | 130.583 | 21.764  | 0.077982 | 6  | 24.691    |
| 0.2031765E 03  | 0.3417402E 03  | 0.3715754E 03 | 54.267  | 8.467   | 0.096918 | 7  | 28.807    |
| 0.3540015E 03  | -0.7636587E 03 | 0.5433335E 03 | 295.178 | 36.897  | 0.205704 | 8  | 32.922    |
| -0.9261322E 02 | -0.1280173E 03 | 0.1580022E 03 | 234.116 | 26.013  | 0.038517 | 9  | 37.037    |
| 0.1147040E 02  | -0.1625537E 02 | 0.1939470E 02 | 305.208 | 30.521  | 0.004850 | 10 | 41.152    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 7 V= 165 KTS n= 1.6 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 392 FLT 481.0 TR 31

| AJ              | HJ              | CJ             | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|-----------------|-----------------|----------------|---------|---------|----------|----|-----------|
| 0.8190277E 01   |                 |                |         |         |          | 1  | 4.082     |
| 0.2916435E 01   | -0.3827657E 01  | 0.4812124E 01  | 307.305 | 307.305 | 1.000000 | 2  | 8.163     |
| -0.2782773E 00  | -0.2176533E 00  | 0.3332363E 00  | 218.031 | 109.015 | 0.073416 | 3  | 12.245    |
| -0.1288482E 00  | 0.3342491E -01  | 0.1330937E 00  | 165.455 | 55.152  | 0.027658 | 4  | 16.327    |
| 0.611114E -01   | -0.5969000E -01 | 0.8543152E -01 | 315.677 | 78.919  | 0.017753 | 5  | 20.408    |
| -0.2323E87E -01 | -0.1517126E -01 | 0.2775269E -01 | 213.138 | 42.628  | 0.005767 | 6  | 24.490    |
| 0.2371E60E -01  | 0.2661593E -01  | 0.3565335E -01 | 48.294  | 8.049   | 0.007409 | 7  | 28.571    |
| -0.6743E60E -01 | -0.2852453E -02 | 0.6743E60E -01 | 182.422 | 26.060  | 0.014027 | 8  | 32.653    |
| -0.1631702E -01 | 0.4485811E -01  | 0.4773358E -01 | 109.989 | 13.749  | 0.009919 | 9  | 36.735    |
| 0.2396568E -01  | 0.3556410E -02  | 0.2423207E -01 | 8.439   | 0.938   | 0.000036 | 10 | 40.816    |
| 0.9323E22E -03  | -0.2512971E -01 | 0.2514700E -01 | 272.125 | 27.212  | 0.005226 |    |           |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 392 FLT 481.0 TR 36

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.7309887E 04 |                |               |         |         |          | 1  | 4.082     |
| -0.2885975E 06 | 0.1151693E 06  | 0.3107233E 05 | 158.245 | 158.245 | 1.000000 | 2  | 8.163     |
| -0.3501E42E 03 | -0.3524086E 04 | 0.3627374E 04 | 256.313 | 128.157 | 0.011673 | 3  | 12.245    |
| -0.4434151E 03 | -0.4227903E 05 | 0.6130362E 05 | 223.604 | 74.535  | 0.197290 | 4  | 16.327    |
| 0.1715527E 04  | 0.1563530E 04  | 0.2609352E 04 | 48.607  | 12.202  | 0.008398 | 5  | 20.408    |
| 0.8763714E 04  | 0.1235319E 05  | 0.1514639E 05 | 54.647  | 10.329  | 0.048744 | 6  | 24.490    |
| 0.1516.07E 04  | -0.1529696E 03 | 0.1523703E 04 | 354.239 | 57.040  | 0.004704 | 7  | 28.571    |
| 0.1507319E 04  | 0.4725102E 04  | 0.4728258E 04 | 71.649  | 10.236  | 0.010021 | 8  | 32.653    |
| 0.8517E75E 03  | 0.1563403E 03  | 0.8741033E 03 | 12.980  | 1.623   | 0.002813 | 9  | 36.735    |
| 0.1371E11E 04  | -0.1264853E 04 | 0.1825335E 04 | 318.695 | 35.411  | 0.009874 | 10 | 40.816    |
| -0.5774455E 03 | 0.2692307E 03  | 0.6371267E 03 | 155.003 | 15.500  | 0.002050 |    |           |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 392 FLT 481.0 TR 11

| AJ              | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|-----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.4414219E 03  |                |               |         |         |          | 1  | 4.082     |
| 0.5576616E 07   | -0.4474937E 03 | 0.4539551E 03 | 277.104 | 277.104 | 1.000000 | 2  | 8.163     |
| 0.1552676E 03   | -0.3853616E 03 | 0.4154653E 03 | 291.945 | 145.973 | 0.921301 | 3  | 12.245    |
| -0.3208E94E 03  | -0.1671474E 03 | 0.3617937E 03 | 207.516 | 69.172  | 0.802283 | 4  | 16.327    |
| -0.5380432E 01  | 0.1836758E 01  | 0.5335337E 01 | 161.151 | 40.288  | 0.012607 | 5  | 20.408    |
| -0.5906223E 02  | -0.6396948E 02 | 0.8736217E 02 | 227.262 | 45.456  | 0.153063 | 6  | 24.490    |
| -0.7424565E 02  | -0.7241909E 01 | 0.7451716E 02 | 185.571 | 30.928  | 0.165422 | 7  | 28.571    |
| -0.7501001E 02  | -0.6250342E 02 | 0.4763779E 02 | 219.803 | 31.400  | 0.216514 | 8  | 32.653    |
| -0.2655483E 02  | 0.5454608E 01  | 0.2155615E 02 | 165.240 | 20.655  | 0.047824 | 9  | 36.735    |
| -0.3639212E -01 | 0.2340976E 02  | 0.2340977E 02 | 90.008  | 10.010  | 0.051912 | 10 | 40.816    |
| 0.2914728E 02   | 0.3639603E 02  | 0.4600722E 02 | 52.293  | 5.220   | 0.102026 |    |           |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 394 CTR 392 FLT 481.0 TR 1

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.3420194E 04  |                |               |         |         |          | 1  | 4.082     |
| -0.6564538E 05 | 0.2756541E 05  | 0.7435800E 05 | 157.408 | 157.408 | 1.000000 | 2  | 8.163     |
| 0.1762745E 04  | -0.1451321E 05 | 0.1462225E 05 | 277.003 | 138.501 | 0.196646 | 3  | 12.245    |
| -0.7347E32E 04 | -0.3305653E 04 | 0.3305723E 04 | 204.215 | 68.072  | 0.108350 | 4  | 16.327    |
| -0.1692254E 04 | 0.4187139E 03  | 0.1743335E 04 | 166.105 | 41.526  | 0.023448 | 5  | 20.408    |
| 0.4585789E 03  | 0.7067720E 03  | 0.3441373E 03 | 57.097  | 11.419  | 0.011353 | 6  | 24.490    |
| 0.1305507E 04  | 0.1031823E 04  | 0.2167234E 04 | 28.430  | 4.738   | 0.029146 | 7  | 28.571    |
| 0.7104275E 01  | 0.6228703E 03  | 0.5226177E 03 | 89.505  | 12.786  | 0.011060 | 8  | 32.653    |
| -0.1172442E 03 | -0.8546125E 03 | 0.3923E23E 03 | 262.187 | 32.773  | 0.011604 | 9  | 36.735    |
| 0.4092E25E 03  | -0.1022626E 04 | 0.1125155E 04 | 244.649 | 32.733  | 0.015131 | 10 | 40.816    |
| 0.6308452E 02  | -0.4601714E 03 | 0.4601712E 03 | 278.050 | 27.805  | 0.006250 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 7 V= 165 KTS n= 1.6 g

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1004 T 394 CTR 392 FLT 481.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1469263F 05  |                |               |         |         |          |    |           |
| 0.5194840E 05  | -0.1419296E 05 | 0.5385236E 05 | 344.719 | 344.719 | 0.973621 | 1  | 4.082     |
| 0.3953103E 05  | -0.3868655E 05 | 0.5531141E 05 | 315.618 | 157.809 | 1.000000 | 2  | 8.163     |
| -0.2231575E 05 | -0.1844532E 05 | 0.2813515E 05 | 219.571 | 73.193  | 0.523493 | 3  | 12.245    |
| 0.3592116E 04  | 0.486667CE 03  | 0.3025232E 04 | 7.747   | 1.937   | 0.065542 | 4  | 16.327    |
| 0.3351446E 04  | 0.2856249E 04  | 0.4427496E 04 | 40.833  | 8.167   | 0.060083 | 5  | 20.408    |
| 0.1787221E 04  | -0.1124077E 04 | 0.2113995E 04 | 327.717 | 54.620  | 0.038220 | 6  | 24.49C    |
| 0.3111490F 04  | 0.2350848E 03  | 0.3127662E 04 | 4.394   | 0.028   | 0.056420 | 7  | 28.571    |
| -0.2285645E 04 | 0.4058003E 03  | 0.2321337E 04 | 169.932 | 21.242  | 0.041969 | 8  | 32.653    |
| -0.1339775E 04 | 0.3417690E 03  | 0.1382630E 04 | 165.689 | 18.410  | 0.024998 | 9  | 36.735    |
| -0.5036604F 03 | -0.0647056E 03 | 0.1001705E 04 | 239.700 | 23.978  | 0.018092 | 10 | 40.816    |

BLADE FLAP AT STA 130.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 1004 T 394 CTR 392 FLT 481.0 TR 19

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1564796E 05  |                |               |         |         |          |    |           |
| 0.4200374E 03  | -0.4143734E 04 | 0.4164965E 04 | 275.788 | 275.788 | 0.573172 | 1  | 4.082     |
| -0.3179C75E 04 | 0.6544149E 04  | 0.7266516E 04 | 115.444 | 57.972  | 1.000000 | 2  | 8.163     |
| 0.2028C52E 04  | 0.1834647E 04  | 0.2736762E 04 | 42.134  | 14.045  | 0.376351 | 3  | 12.245    |
| 0.9720728E 03  | -0.2668472E 03 | 0.1004034E 04 | 344.650 | 80.162  | 0.138723 | 4  | 16.327    |
| -0.7519422E 03 | -0.1080661E 04 | 0.1316551E 04 | 235.168 | 47.034  | 0.181180 | 5  | 20.408    |
| -0.1026180E 04 | -0.1737229E 03 | 0.1043781E 04 | 189.609 | 31.001  | 0.143230 | 6  | 24.490    |
| -0.8006582E 03 | -0.6838025E 03 | 0.1052414E 04 | 220.499 | 31.000  | 0.144900 | 7  | 28.571    |
| 0.2565701E 03  | -0.2573276E 03 | 0.3466437E 03 | 318.275 | 39.784  | 0.053209 | 8  | 32.653    |
| 0.1365C23E 03  | -0.5514281E 02 | 0.1576213E 03 | 336.859 | 37.429  | 0.020728 | 9  | 36.735    |
| 0.7422455E 02  | -0.1355809E 03 | 0.1570333E 03 | 300.299 | 30.030  | 0.021610 | 10 | 40.816    |

BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 392 FLT 481.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1306395F 04  |                |               |         |         |          |    |           |
| 0.2621681E 04  | -0.6154188E 04 | 0.6639336E 04 | 293.074 | 293.074 | 0.909047 | 1  | 4.082     |
| -0.2497565E 04 | 0.6921608F 04  | 0.7353621E 04 | 109.844 | 54.922  | 1.000000 | 2  | 8.163     |
| 0.2354406E 04  | 0.7134392E 03  | 0.2465057E 04 | 16.835  | 5.612   | 0.334989 | 3  | 12.245    |
| -0.6107312F 03 | 0.3781472E 03  | 0.7168135E 03 | 148.237 | 37.059  | 0.097615 | 4  | 16.327    |
| 0.2078135E 03  | 0.5747964E 03  | 0.6112047E 03 | 70.123  | 14.025  | 0.083060 | 5  | 20.408    |
| 0.3452283F 03  | 0.4809617E 03  | 0.5723559E 03 | 54.330  | 4.055   | 0.060455 | 6  | 24.49C    |
| 0.3579427E 01  | 0.5487048E 03  | 0.5487163E 03 | 89.626  | 12.604  | 0.074568 | 7  | 28.571    |
| -0.2974457E 03 | -0.7114543E 03 | 0.7833033E 03 | 247.837 | 30.380  | 0.107331 | 8  | 32.653    |
| -0.3371404E 03 | -0.5060449E 03 | 0.6030667E 03 | 236.327 | 26.259  | 0.082633 | 9  | 36.735    |
| -0.4152429E 03 | -0.2944614E 02 | 0.4160244E 03 | 183.514 | 18.351  | 0.056536 | 10 | 40.816    |

BLADE FLAP AT STA 205

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 392 FLT 481.0 TR 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.8828750F 04 |                |               |         |         |          |    |           |
| -0.3459C43E 04 | 0.6220750E 04  | 0.7117793E 04 | 119.077 | 119.077 | 1.000000 | 1  | 4.082     |
| 0.3164P91E 04  | -0.5421254E 04 | 0.6287563E 04 | 300.433 | 150.217 | 0.883358 | 2  | 8.163     |
| -0.1963282E 04 | -0.9548594E 03 | 0.2201173E 04 | 205.709 | 68.570  | 0.309249 | 3  | 12.245    |
| 0.8392452E 03  | -0.4539432E 03 | 0.7733908E 03 | 324.521 | 82.380  | 0.136819 | 4  | 16.327    |
| -0.6124444E 03 | -0.1149249E 04 | 0.1302263E 04 | 24.146  | 48.384  | 0.182959 | 5  | 20.408    |
| -0.6811753E 03 | -0.3428148E 03 | 0.7625779E 03 | 206.715 | 34.452  | 0.107137 | 6  | 24.490    |
| -0.3951E43E 03 | -0.3559026F 03 | 0.3523544E 03 | 234.591 | 33.513  | 0.055624 | 7  | 28.571    |
| -0.4221583E 02 | 0.1170113E 03  | 0.1243751E 03 | 104.840 | 13.730  | 0.017477 | 8  | 32.653    |
| 0.7458791F 02  | 0.2521077E 03  | 0.3013444E 03 | 75.621  | 8.402   | 0.042366 | 9  | 36.735    |
| 0.9375683E 02  | 0.9362054E 02  | 0.1303902E 03 | 45.890  | 4.589   | 0.016319 | 10 | 40.816    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 7 V= 165 KTS n= 1.6 g

## BLADE FLAP AT STA 233

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 392 FLT 481.0 TR 4

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.6769438E 03  |                |               |         |         |          |    |           |
| -0.2142002E 04 | 0.4447609E 04  | 0.4730535E 04 | 115.716 | 115.716 | 1.000000 | 1  | 4.082     |
| 0.2616530E 04  | -0.3428126E 04 | 0.4312573E 04 | 307.353 | 153.676 | 0.873603 | 2  | 8.163     |
| -0.1725262E 04 | -0.1250791E 04 | 0.2109033E 04 | 215.942 | 71.981  | 0.431672 | 3  | 12.245    |
| 0.6016223E 04  | -0.7140191E 04 | 0.9333521E 03 | 310.129 | 77.532  | 0.189172 | 4  | 16.327    |
| -0.8315633E 03 | -0.1151545E 04 | 0.1450257E 04 | 232.564 | 46.513  | 0.253780 | 5  | 20.408    |
| -0.9837168E 03 | -0.1802240E 03 | 0.1033079E 04 | 190.382 | 31.730  | 0.202589 | 6  | 24.490    |
| -0.7207261E 03 | -0.3527920E 03 | 0.8208115E 03 | 208.590 | 29.793  | 0.166273 | 7  | 28.571    |
| -0.8716537E 02 | -0.9074800E 03 | 0.9116570E 03 | 275.487 | 34.436  | 0.184675 | 8  | 32.653    |
| -0.5280468E 02 | -0.4154417E 03 | 0.4117733E 03 | 262.783 | 29.198  | 0.084028 | 9  | 36.735    |
| -0.2364230E 02 | 0.6553701E 02  | 0.7004744E 02 | 109.726 | 10.973  | 0.014190 | 10 | 40.816    |

## BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 392 FLT 481.0 TR 26

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.3344228E 04  |                |               |         |         |          |    |           |
| -0.2931238E 03 | 0.1361241E 04  | 0.1372446E 04 | 102.153 | 102.153 | 0.618435 | 1  | 4.082     |
| 0.1629622E 04  | -0.1554503E 04 | 0.2251504E 04 | 316.337 | 158.169 | 1.000000 | 2  | 8.163     |
| -0.1279518E 04 | -0.6475946E 03 | 0.1604500E 04 | 217.089 | 72.363  | 0.712618 | 3  | 12.245    |
| 0.2101241E 03  | -0.6577140E 03 | 0.7236733E 03 | 286.760 | 71.690  | 0.323630 | 4  | 16.327    |
| -0.5770471E 03 | -0.7332898E 03 | 0.9331110E 03 | 231.800 | 46.360  | 0.414428 | 5  | 20.408    |
| -0.7745443E 03 | 0.1535800E 03  | 0.8331323E 03 | 166.053 | 27.675  | 0.356700 | 6  | 24.490    |
| -0.5513796E 03 | -0.1450826E 03 | 0.6039163E 03 | 193.784 | 27.683  | 0.270441 | 7  | 28.571    |
| -0.1749056E 03 | -0.8422573E 03 | 0.9502263E 03 | 255.268 | 32.284  | 0.382057 | 8  | 32.653    |
| -0.1441591E 03 | -0.5833333E 03 | 0.6303713E 03 | 250.115 | 28.457  | 0.266877 | 9  | 36.735    |
| -0.2301861E 03 | -0.2312660E 03 | 0.3263113E 03 | 225.157 | 22.514  | 0.144926 | 10 | 40.816    |

## BLADE CHORD AT STA 303

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 392 FLT 481.0 TR 17

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2236094E 06  |                |               |         |         |          |    |           |
| 0.2840343E 05  | -0.4501406E 04 | 0.2995043E 05 | 341.504 | 341.504 | 0.870366 | 1  | 4.082     |
| 0.2447207E 05  | -0.2414216E 05 | 0.3441137E 05 | 315.324 | 157.665 | 1.000000 | 2  | 8.163     |
| -0.2393651E 05 | -0.8247965E 04 | 0.2531708E 05 | 199.013 | 66.338  | 0.735736 | 3  | 12.245    |
| 0.8972824E 04  | -0.2180912E 04 | 0.9136922E 04 | 346.140 | 86.548  | 0.245520 | 4  | 16.327    |
| -0.7272290E 03 | 0.1115443E 04  | 0.1331539E 04 | 123.103 | 24.521  | 0.038696 | 5  | 20.408    |
| 0.1425505E 04  | 0.1656050E 03  | 0.1435547E 04 | 6.624   | 1.104   | 0.041717 | 6  | 24.490    |
| -0.8254348E 03 | 0.6565955E 03  | 0.1054732E 04 | 141.499 | 20.214  | 0.030651 | 7  | 28.571    |
| -0.2929148E 03 | 0.9659721E 02  | 0.3040037E 03 | 161.396 | 20.175  | 0.008981 | 8  | 32.653    |
| 0.1986876E 04  | -0.5152056E 03 | 0.2052536E 04 | 345.463 | 38.385  | 0.059648 | 9  | 36.735    |
| -0.1162248E 03 | -0.2594478E 03 | 0.2542310E 03 | 245.869 | 24.587  | 0.008262 | 10 | 40.816    |

## BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 394 CTR 392 FLT 481.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1509901E 05  |                |               |         |         |          |    |           |
| 0.9148566E 04  | -0.3255247E 03 | 0.9204324E 04 | 357.973 | 357.973 | 0.394864 | 1  | 4.082     |
| 0.1414736E 05  | -0.1852005E 05 | 0.2331313E 05 | 307.367 | 153.683 | 1.000000 | 2  | 8.163     |
| -0.1661501E 05 | -0.2045099E 04 | 0.1574033E 05 | 187.017 | 62.339  | 0.718159 | 3  | 12.245    |
| 0.7005051E 04  | -0.1548078E 04 | 0.7273833E 04 | 344.454 | 86.115  | 0.311919 | 4  | 16.327    |
| -0.6080810E 03 | 0.1286382E 04  | 0.1422855E 04 | 115.300 | 23.060  | 0.061040 | 5  | 20.408    |
| 0.2001157E 04  | 0.1568904E 03  | 0.2036437E 04 | 4.312   | 0.719   | 0.086093 | 6  | 24.490    |
| -0.7803336E 03 | 0.2067782E 04  | 0.2213122E 04 | 110.075 | 15.811  | 0.054814 | 7  | 28.571    |
| 0.1744324E 04  | -0.1019568E 03 | 0.1797213E 04 | 350.748 | 44.593  | 0.077100 | 8  | 32.653    |
| 0.2230018E 04  | -0.1151681E 04 | 0.2228455E 04 | 331.881 | 36.876  | 0.108470 | 9  | 36.735    |
| 0.1137189E 03  | -0.6140550E 03 | 0.6294089E 03 | 280.409 | 28.041  | 0.027002 | 10 | 40.816    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 7 V= 165 KTS n= 1.6 g

## BLADE CHORD AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 100V T 394 CTR 392 FLT 481.0 TR 22

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2112500E 03 | -0.1854671E 04 | 0.3231102E 04 | 324.972 | 324.972 | 0.461176 | 1  | 4.082     |
| 0.2646036E 04  | -0.5010254E 04 | 0.7005652E 04 | 314.351 | 157.175 | 1.000000 | 2  | 8.163     |
| 0.4896012E 04  | -0.1018361E 04 | 0.5768227E 04 | 190.371 | 63.457  | 0.823250 | 3  | 12.245    |
| -0.5673596E 04 | -0.6249305E 03 | 0.2531225E 04 | 345.531 | 88.383  | 0.356979 | 4  | 16.327    |
| 0.2421657E 04  | 0.1202619E 04  | 0.1243973E 04 | 105.656 | 21.131  | 0.178256 | 5  | 20.408    |
| -0.3370457E 03 | 0.6068203E 03  | 0.1111327E 04 | 33.078  | 5.513   | 0.158682 | 6  | 24.490    |
| 0.9316274E 03  | 0.1012328E 04  | 0.1070350E 04 | 109.045 | 15.578  | 0.154848 | 7  | 28.571    |
| -0.3494870E 03 | 0.1675098E 03  | 0.9317334E 03 | 10.357  | 1.295   | 0.132978 | 8  | 32.653    |
| 0.9165520E 03  | -0.3845015E 03 | 0.1324233E 04 | 343.182 | 38.131  | 0.189567 | 9  | 36.735    |
| 0.1271423E 04  | -0.5603337E 03 | 0.3355369E 03 | 259.721 | 25.972  | 0.055167 | 10 | 40.816    |

## BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 100V T 394 CTR 392 FLT 481.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2388214E 03 | 0.3763742E 04  | 0.3139945E 04 | 47.404  | 47.404  | 1.000000 | 1  | 4.082     |
| 0.3476844E 04  | 0.2115760E 04  | 0.2117034E 04 | 93.187  | 46.594  | 0.411879 | 2  | 8.163     |
| -0.1176574E 03 | -0.6489336E 03 | 0.8724214E 03 | 311.941 | 103.980 | 0.169734 | 3  | 12.245    |
| 0.5830589E 03  | 0.3577144E 03  | 0.1138814E 04 | 161.179 | 40.295  | 0.215725 | 4  | 16.327    |
| -0.1044524E 04 | 0.1664772E 04  | 0.1950311E 04 | 58.579  | 11.716  | 0.379545 | 5  | 20.408    |
| 0.1017012E 04  | 0.2194377E 03  | 0.1353310E 04 | 9.245   | 1.541   | 0.265726 | 6  | 24.490    |
| 0.1349074E 04  | 0.2552243E 03  | 0.3613797E 03 | 44.850  | 6.407   | 0.070409 | 7  | 28.571    |
| 0.2565725E 03  | -0.1256430E 04 | 0.1332558E 04 | 264.467 | 33.058  | 0.253419 | 8  | 32.653    |
| -0.1255883E 03 | -0.1864814E 03 | 0.2001707E 03 | 180.513 | 20.057  | 0.040504 | 9  | 36.735    |
| 0.2081423E 03  | 0.1450544E 02  | 0.1445544E 03 | 5.769   | 0.577   | 0.028085 | 10 | 40.816    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 8 V= 204.5 KTS n= 1.06 g



## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 522 FLT 609.0 TR 31

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.5977075E-01  |                |               |         |         |          | 1  | 4.098     |
| 0.1855185E-01  | -0.6472053E-01 | 0.1565208E-01 | 340.753 | 340.753 | 1.000000 | 2  | 8.197     |
| -0.1572785E-01 | -0.1198324E-01 | 0.1976068E-01 | 217.256 | 108.629 | 0.100553 | 3  | 12.295    |
| 0.2633124E-01  | 0.1103720E-01  | 0.1212667E-01 | 77.450  | 25.019  | 0.021707 | 4  | 16.393    |
| -0.4412136E-01 | -0.2305117E-01 | 0.4557527E-01 | 238.243 | 52.061  | 0.025432 | 5  | 20.492    |
| -0.4371143E-01 | 0.5460357E-01  | 0.7010076E-01 | 121.576 | 25.715  | 0.035671 | 6  | 24.590    |
| -0.1453235E-01 | 0.1011778E-01  | 0.2377602E-01 | 121.678 | 21.240  | 0.012078 | 7  | 28.689    |
| -0.1247342E-01 | 0.2022017E-01  | 0.2376475E-01 | 121.650 | 17.380  | 0.012073 | 8  | 32.787    |
| 0.7106637E-01  | 0.2005801E-01  | 0.2290823E-01 | 61.114  | 7.635   | 0.011657 | 9  | 36.885    |
| 0.6530700E-02  | 0.3335301E-02  | 0.1107205E-01 | 53.405  | 5.934   | 0.005634 | 10 | 40.984    |
| 0.2220472E-02  | 0.7011412E-02  | 0.6120870E-02 | 74.132  | 7.413   | 0.004132 |    |           |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 522 FLT 609.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.0905620E-03 |                |               |         |         |          | 1  | 4.098     |
| -0.4793130E-03 | 0.1106104E-03  | 0.1572363E-03 | 130.024 | 130.024 | 1.000000 | 2  | 8.197     |
| -0.4490010E-03 | 0.2810225E-03  | 0.2933117E-03 | 147.903 | 73.952  | 0.034804 | 3  | 12.295    |
| -0.1753110E-03 | 0.2259671E-03  | 0.2851433E-03 | 127.809 | 42.603  | 0.187797 | 4  | 16.393    |
| 0.4230104E-03  | 0.2192202E-03  | 0.4710934E-03 | 27.517  | 6.879   | 0.031158 | 5  | 20.492    |
| 0.3072007E-03  | 0.7733017E-03  | 0.1345127E-03 | 47.953  | 4.591   | 0.068563 | 6  | 24.590    |
| -0.4742055E-03 | 0.4013531E-03  | 0.4730383E-03 | 100.767 | 16.794  | 0.030905 | 7  | 28.689    |
| 0.5002480E-03  | -0.1705764E-03 | 0.1070322E-03 | 208.332 | 41.190  | 0.012302 | 8  | 32.787    |
| -0.0003007E-03 | -0.1477745E-03 | 0.2734106E-03 | 246.949 | 30.875  | 0.013752 | 9  | 36.885    |
| -0.1700055E-03 | -0.1607552E-03 | 0.1776137E-03 | 185.386 | 20.598  | 0.011665 | 10 | 40.984    |
| -0.2201940E-03 | 0.1202700E-03  | 0.1222354E-03 | 100.448 | 10.045  | 0.009031 |    |           |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 522 FLT 609.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.5566644E-02 |                |               |         |         |          | 1  | 4.098     |
| -0.1409932E-01 | 0.4331051E-02  | 0.1470250E-01 | 162.990 | 162.990 | 0.353857 | 2  | 8.197     |
| 0.3038254E-01  | -0.2379610E-01 | 0.4156607E-01 | 125.078 | 102.533 | 1.000000 | 3  | 12.295    |
| -0.2417035E-02 | 0.1010173E-01  | 0.1534127E-01 | 99.530  | 52.635  | 0.353121 | 4  | 16.393    |
| 0.5005532E-02  | -0.1397735E-01 | 0.1513509E-01 | 292.556 | 73.139  | 0.364154 | 5  | 20.492    |
| -0.5033276E-02 | 0.2013940E-01  | 0.6657239E-02 | 154.795 | 30.999  | 0.100153 | 6  | 24.590    |
| -0.6385602E-02 | 0.1062459E-01  | 0.1242227E-01 | 117.335 | 19.884  | 0.278342 | 7  | 28.689    |
| -0.2433710E-02 | -0.1405370E-01 | 0.2437793E-02 | 183.336 | 26.167  | 0.301046 | 8  | 32.787    |
| -0.1116006E-02 | 0.1024701E-02  | 0.1515721E-02 | 137.454 | 17.183  | 0.036464 | 9  | 36.885    |
| 0.1570953E-01  | -0.3284215E-02 | 0.3287575E-02 | 272.739 | 50.304  | 0.079079 | 10 | 40.984    |
| -0.2777322E-02 | 0.1705105E-02  | 0.3298020E-02 | 143.434 | 14.640  | 0.076376 |    |           |

## TIMED HINGE FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 522 FLT 609.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.5212350E-05 |                |               |         |         |          | 1  | 4.098     |
| -0.7057819E-05 | 0.3315970E-05  | 0.3523358E-05 | 122.320 | 122.320 | 1.000000 | 2  | 8.197     |
| 0.1017273E-05  | -0.2127242E-05 | 0.2358001E-05 | 275.557 | 147.779 | 0.600933 | 3  | 12.295    |
| 0.4475918E-05  | 0.6004807E-05  | 0.6870527E-05 | 32.072  | 27.357  | 0.175074 | 4  | 16.393    |
| -0.3256658E-05 | -0.2202337E-05 | 0.3533737E-05 | 215.422 | 53.836  | 0.100378 | 5  | 20.492    |
| 0.2147775E-05  | 0.2017270E-05  | 0.3730754E-05 | 43.338  | 8.568   | 0.042315 | 6  | 24.590    |
| 0.1016131E-05  | 0.3153817E-05  | 0.1047359E-05 | 11.036  | 1.839   | 0.041764 | 7  | 28.689    |
| 0.2548055E-05  | 0.2034405E-05  | 0.3581147E-05 | 35.017  | 4.545   | 0.006132 | 8  | 32.787    |
| 0.1233241E-05  | 0.1175007E-05  | 0.1701505E-05 | 43.607  | 5.462   | 0.043375 | 9  | 36.885    |
| -0.1755311E-03 | 0.1752107E-03  | 0.2155579E-03 | 143.517 | 15.945  | 0.005494 | 10 | 40.984    |
| -0.0145593E-02 | 0.4327707E-03  | 0.3420108E-03 | 133.753 | 10.315  | 0.008736 |    |           |



# HARMONIC COMPONENTS OF FLIGHT T T DATA CASE 8 V= 204.5 KTS n= 1.00 g

## FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 522 FLT 609.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.5464463F C5  |                |               |         |         |          |    |           |
| -0.2330943L C5 | 0.8045203F C5  | 0.8375569E U5 | 106.150 | 106.150 | 1.000000 | 1  | 4.098     |
| -0.3942883E C4 | -0.4147458F C3 | 0.3964457E U4 | 186.038 | 93.004  | 0.047311 | 2  | 8.197     |
| -0.2483403E C4 | -0.4135203F C4 | 0.4523605E U4 | 219.013 | 79.671  | 0.057561 | 3  | 12.295    |
| -0.4468784L C3 | -0.1624422L C4 | 0.1624755E U4 | 254.620 | 63.655  | 0.020115 | 4  | 16.393    |
| 0.1412153E U4  | 0.7183110F C3  | 0.1553689E U4 | 27.575  | 5.720   | 0.019018 | 5  | 20.492    |
| 0.1502406E C4  | -0.5329375F C3 | 0.1815745F U4 | 324.153 | 54.860  | 0.021715 | 6  | 24.590    |
| 0.5577555E C3  | -0.6183761E C3 | 0.8354855F U3 | 312.556 | 44.651  | 0.010018 | 7  | 28.689    |
| 0.1236175E C3  | -0.1653746E C2 | 0.1247557E U3 | 351.471 | 43.934  | 0.001492 | 8  | 32.787    |
| 0.3470571E C3  | -0.2327601F C2 | 0.4178620E U3 | 326.151 | 3.7239  | 0.004487 | 9  | 36.885    |
| 0.4331563E U2  | -0.5110074F C2 | 0.1025758E U3 | 277.792 | 25.775  | 0.001229 | 10 | 40.984    |

## BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 522 FLT 609.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.6751016F C2 |                |               |         |         |          |    |           |
| 0.2972454E C4  | -0.3461443F C4 | 0.4575625E U4 | 310.844 | 310.844 | 0.826036 | 1  | 4.098     |
| -0.9301549E C3 | 0.5535238E U4  | 0.5535238E U4 | 49.674  | 49.837  | 1.000000 | 2  | 8.197     |
| 0.1731524E C4  | 0.2357323E C3  | 0.1757586E U4 | 7.664   | 2.555   | 0.324753 | 3  | 12.295    |
| 0.5426036E C3  | -0.1546520F C2 | 0.5765857E U3 | 350.248 | 85.062  | 0.104106 | 4  | 16.393    |
| 0.1414146E C3  | 0.4427661F C2  | 0.4646009E U3 | 72.237  | 14.457  | 0.093571 | 5  | 20.492    |
| 0.2274470E C3  | 0.4121009F C3  | 0.4707004E U3 | 61.135  | 13.184  | 0.085037 | 6  | 24.590    |
| -0.1761750E C3 | -0.1504747E C3 | 0.2316500F U3 | 220.531 | 31.500  | 0.041857 | 7  | 28.689    |
| 0.5732642E U3  | 0.6763500L C2  | 0.1047345F U4 | 56.775  | 7.074   | 0.184214 | 8  | 32.787    |
| -0.6032151F C3 | 0.2347508E C2  | 0.6633622E U3 | 177.541 | 17.727  | 0.119927 | 9  | 36.885    |
| -0.2505547E C3 | -0.4240723E C2 | 0.5064763E U3 | 236.512 | 23.651  | 0.091162 | 10 | 40.984    |

## BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 522 FLT 609.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2694573L U5  |                |               |         |         |          |    |           |
| -0.5220343E C4 | 0.1979544F U5  | 0.2047721E U5 | 104.774 | 104.774 | 1.000000 | 1  | 4.098     |
| -0.9714733E C3 | -0.1074771E U4 | 0.1417236E C4 | 229.444 | 114.722 | 0.692227 | 2  | 8.197     |
| -0.2670994E U3 | 0.1014001F U4  | 0.1053425E C4 | 104.688 | 34.896  | 0.051456 | 3  | 12.295    |
| 0.1771435E C4  | -0.2369764F U4 | 0.3019413E C4 | 208.299 | 77.075  | 0.147498 | 4  | 16.393    |
| -0.2314542E U3 | -0.2045164E U4 | 0.2082760E U4 | 243.428 | 52.635  | 0.101741 | 5  | 20.492    |
| -0.7262746E U3 | -0.1391049L U4 | 0.1569233E C4 | 247.431 | 40.405  | 0.076652 | 6  | 24.590    |
| 0.1248075E U4  | 0.6255448F U3  | 0.1346904E C4 | 26.821  | 3.803   | 0.068237 | 7  | 28.689    |
| -0.5420075E C3 | -0.7023441E C2 | 0.5471298E C3 | 352.624 | 44.078  | 0.026725 | 8  | 32.787    |
| -0.5847124E C3 | 0.7209721E C3  | 0.1144751E U4 | 140.951 | 15.661  | 0.055898 | 9  | 36.885    |
| -0.4155574E C3 | -0.4783097E C2 | 0.4247375E C3 | 191.934 | 19.193  | 0.020747 | 10 | 40.984    |

## BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 522 FLT 609.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.4364524E C3  |                |               |         |        |          |    |           |
| 0.1404874F C4  | 0.1309940F C4  | 0.1924531F C4 | 42.897  | 42.897 | 0.911567 | 1  | 4.098     |
| -0.1772150E C4 | 0.1147515E C4  | 0.2111273E C4 | 147.076 | 72.538 | 1.000000 | 2  | 8.197     |
| -0.1016021E C4 | -0.6956011F C3 | 0.4013547E C3 | 263.727 | 87.841 | 0.426933 | 3  | 12.295    |
| -0.2377624F C3 | -0.1927258F C3 | 0.6593842F C3 | 196.068 | 44.022 | 0.312323 | 4  | 16.393    |
| 0.1560572L U4  | 0.1542277L C2  | 0.1560184E C4 | 5.646   | 1.130  | 0.742781 | 5  | 20.492    |
| 0.1140119E C4  | -0.5341917E C3 | 0.1259058E C4 | 334.895 | 55.716 | 0.596262 | 6  | 24.590    |
| 0.7506830E U2  | -0.2615760F C3 | 0.2724147L C3 | 285.443 | 65.896 | 0.129033 | 7  | 28.689    |
| 0.3647400F C3  | 0.8118540E C2  | 0.8900237E C3 | 45.807  | 8.226  | 0.401566 | 8  | 32.787    |
| -0.4048879E C3 | -0.9118126E C2 | 0.4254185E C2 | 142.627 | 21.403 | 0.206239 | 9  | 36.885    |
| -0.4562376E C2 | -0.1573251E C3 | 0.1646707E C3 | 257.826 | 25.283 | 0.077997 | 10 | 40.984    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 9 V= 204.5 KTS n= 1.11 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 527 FLT 609.0 TR 31

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.6023300E 01  |                |               |         |         |          | 1  | 4.098     |
| 0.1944990E 01  | -0.8850724E 01 | 0.2120654E 01 | 336.022 | 336.022 | 1.000000 | 2  | 8.197     |
| -0.1814612E 01 | -0.2549722E 01 | 0.3129520E 01 | 234.501 | 117.280 | 0.147316 | 3  | 12.295    |
| 0.5135132E 01  | 0.5321463E 01  | 0.7355315E 01 | 46.019  | 15.340  | 0.034741 | 4  | 16.393    |
| -0.2107943E 01 | -0.3881958E 01 | 0.4225358E 01 | 240.074 | 60.019  | 0.014850 | 5  | 20.492    |
| -0.1910370E 01 | 0.2510355E 01  | 0.3158755E 01 | 127.357 | 22.471  | 0.014337 | 6  | 24.590    |
| 0.7346035E 02  | 0.1205138E 01  | 0.1413589E 01 | 53.452  | 9.744   | 0.006643 | 7  | 28.689    |
| 0.3541771E 01  | 0.2632076E 01  | 0.2656377E 02 | 32.337  | 11.702  | 0.001248 | 8  | 32.787    |
| -0.1107718E 02 | 0.2707277E 02  | 0.2543216E 02 | 112.113 | 14.314  | 0.001303 | 9  | 36.885    |
| 0.4322477E 02  | 0.2224975E 02  | 0.4660573E 02 | 27.215  | 3.324   | 0.002233 | 10 | 40.984    |
| 0.3436133E 02  | -0.1413670E 02 | 0.1841486E 02 | 335.151 | 33.516  | 0.001805 |    |           |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 527 FLT 609.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.4915121E 04 |                |               |         |         |          | 1  | 4.098     |
| -0.1173455E 04 | 0.1233020E 04  | 0.1635376E 04 | 131.016 | 131.016 | 1.000000 | 2  | 8.197     |
| 0.7396456E 04  | 0.5112107E 04  | 0.6435413E 04 | 52.740  | 26.370  | 0.034354 | 3  | 12.295    |
| -0.1805013E 05 | 0.1458444E 05  | 0.2104443E 05 | 137.742 | 45.914  | 0.132620 | 4  | 16.393    |
| 0.1276019E 04  | 0.4589078E 04  | 0.4753875E 04 | 74.431  | 18.008  | 0.029130 | 5  | 20.492    |
| 0.3340731E 04  | 0.3310553E 04  | 0.1038257E 05 | 18.596  | 3.719   | 0.003487 | 6  | 24.590    |
| -0.4530354E 05 | -0.1356214E 04 | 0.1304355E 04 | 255.576 | 42.703  | 0.011604 | 7  | 28.689    |
| 0.3364724E 05  | -0.2478641E 04 | 0.2428012E 04 | 280.595 | 40.065  | 0.017908 | 8  | 32.787    |
| -0.1912439E 05 | -0.1757135E 05 | 0.2624331E 05 | 223.220 | 27.902  | 0.001605 | 9  | 36.885    |
| -0.1120415E 04 | 0.3372517E 05  | 0.1355714E 04 | 160.902 | 19.545  | 0.003290 | 10 | 40.984    |
| 1.2720154E 03  | -0.6349305E 01 | 0.2723304E 03 | 358.656 | 35.366  | 0.001669 |    |           |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 527 FLT 609.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.6372205E 02 |                |               |         |         |          | 1  | 4.098     |
| -0.1506753E 03 | 0.6704446E 01  | 0.1510242E 03 | 177.455 | 177.455 | 0.383905 | 2  | 8.197     |
| 0.3363217E 03  | -0.2421639E 01 | 0.4150056E 03 | 324.182 | 162.091 | 1.000000 | 3  | 12.295    |
| -0.1001954E 02 | 0.1305258E 03  | 0.1307370E 03 | 74.375  | 31.465  | 0.315025 | 4  | 16.393    |
| 0.4915169E 02  | -0.1475000E 03 | 0.1554740E 03 | 238.330 | 72.107  | 0.274631 | 5  | 20.492    |
| -0.7547315E 02 | 0.3611008E 02  | 0.6370197E 02 | 154.347 | 30.878  | 0.201639 | 6  | 24.590    |
| -0.5021346E 02 | 0.1135974E 02  | 0.1245355E 03 | 113.773 | 18.962  | 0.309154 | 7  | 28.689    |
| 0.5070654E 01  | 0.1450056E 02  | 0.1755447E 02 | 76.875  | 10.485  | 0.303263 | 8  | 32.787    |
| -0.1177684E 02 | 0.1814945E 02  | 0.2163536E 02 | 122.979 | 15.372  | 0.052133 | 9  | 36.885    |
| -0.1946133E 01 | -0.2252770E 02 | 0.2301460E 02 | 265.019 | 29.447  | 0.055456 | 10 | 40.984    |
| -0.2434572E 02 | 0.2303638E 02  | 0.3155113E 02 | 139.803 | 13.580  | 0.076026 |    |           |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 527 FLT 609.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.5017357E 05 |                |               |         |         |          | 1  | 4.098     |
| -0.2231639E 05 | 0.3425283E 05  | 0.4052582E 05 | 123.178 | 123.178 | 1.000000 | 2  | 8.197     |
| 0.1104704E 05  | -0.2241745E 05 | 0.2498731E 05 | 296.233 | 148.119 | 0.610551 | 3  | 12.295    |
| 0.4221484E 05  | 0.5537219E 04  | 0.6008473E 04 | 81.172  | 27.057  | 0.146814 | 4  | 16.393    |
| -0.3718019E 04 | -0.2675652E 04 | 0.4703344E 04 | 217.720 | 54.430  | 0.114650 | 5  | 20.492    |
| 0.2585741E 04  | 0.1413747E 04  | 0.2581211E 04 | 29.848  | 5.470   | 0.072644 | 6  | 24.590    |
| 0.2030377E 04  | -0.1745013E 03 | 0.2074111E 04 | 355.050 | 59.175  | 0.050800 | 7  | 28.689    |
| 0.5167542E 03  | 0.6853115E 03  | 0.0615017E 03 | 53.142  | 7.592   | 0.021050 | 8  | 32.787    |
| 0.7191836E 03  | 0.4351875E 03  | 0.1179745E 04 | 52.439  | 6.555   | 0.028826 | 9  | 36.885    |
| -0.1940461E 03 | -0.3326056E 03 | 0.3555078E 03 | 237.324 | 26.369  | 0.038784 | 10 | 40.984    |
| -0.6167256E 02 | -0.1664550E 01 | 0.4173320E 02 | 103.423 | 18.342  | 0.011510 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 9 V= 204.5 KTS n= 1.11 g

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 472 CTR 527 FLT 609.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.5278654E 05  |                |               |         |         |          | 1  | 4.098     |
| -0.3243688E 05 | 0.7512150E 05  | 0.8352494E 05 | 112.303 | 112.303 | 1.000000 | 2  | 8.197     |
| -0.6025344E 04 | 0.2525640E 04  | 0.6534695E 04 | 157.224 | 73.612  | 0.076405 | 3  | 12.295    |
| 0.1378752E 04  | -0.5531816E 04 | 0.5745574E 04 | 203.675 | 94.625  | 0.067223 | 4  | 16.393    |
| 0.5723044E 03  | -0.1504544E 04 | 0.1507206E 04 | 246.736 | 71.684  | 0.023257 | 5  | 20.492    |
| -0.1513743E 03 | 0.3064075E 04  | 0.3067716E 04 | 92.823  | 18.566  | 0.035858 | 6  | 24.590    |
| 0.1750841E 04  | 0.6263949E 03  | 0.1902541E 04 | 19.219  | 3.203   | 0.022249 | 7  | 28.689    |
| 0.4520475E 03  | -0.6594375E 03 | 0.5710715E 03 | 277.743 | 42.335  | 0.011354 | 8  | 32.787    |
| 0.9455867E 03  | 0.1472811E 03  | 0.5534598E 03 | 4.862   | 1.108   | 0.011177 | 9  | 36.885    |
| 0.1165776E 04  | 0.3375520E 03  | 0.1213544E 04 | 16.139  | 1.790   | 0.014224 | 10 | 40.984    |
| 0.4363635E 03  | 0.7135037E 02  | 0.5434620E 03 | 36.160  | 3.616   | 0.006319 |    |           |

BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 472 CTR 527 FLT 609.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.6217537E 03  |                |               |         |         |          | 1  | 4.098     |
| 0.2947447E 04  | -0.3581825E 04 | 0.4652130E 04 | 309.633 | 309.633 | 0.822539 | 2  | 8.197     |
| -0.4337134E 03 | 0.5639445E 04  | 0.5655352E 04 | 94.396  | 47.183  | 1.000000 | 3  | 12.295    |
| 0.1431534E 04  | 0.1455651E 03  | 0.1431336E 04 | 5.967   | 1.990   | 0.254486 | 4  | 16.393    |
| 0.8894437E 03  | -0.2231563E 03 | 0.1156144E 04 | 305.601 | 76.653  | 0.236615 | 5  | 20.492    |
| -0.2035471E 03 | 0.3033071E 03  | 0.5313236E 03 | 106.663 | 21.733  | 0.112633 | 6  | 24.590    |
| 0.1749197E 03  | -0.1555580E 03 | 0.2027100E 03 | 309.774 | 51.629  | 0.035878 | 7  | 28.689    |
| 0.1678733E 03  | -0.1755360E 02 | 0.1867155E 03 | 354.635 | 53.662  | 0.033466 | 8  | 32.787    |
| 0.1613111E 03  | 0.6023198E 03  | 0.6242275E 03 | 75.319  | 9.377   | 0.110333 | 9  | 36.885    |
| -0.5518327E 03 | 0.4573882E 02  | 0.5503775E 03 | 171.201 | 19.022  | 0.339397 | 10 | 40.984    |
| -0.5230275E 04 | -0.3335233E 03 | 0.6217537E 03 | 212.493 | 21.249  | 0.109636 |    |           |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 472 CTR 527 FLT 609.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2560371E 05  |                |               |         |         |          | 1  | 4.098     |
| -0.7601849E 04 | 0.1946241E 05  | 0.2096795E 05 | 111.844 | 111.844 | 1.000000 | 2  | 8.197     |
| -0.3645473E 03 | -0.1086457E 03 | 0.4280543E 03 | 206.059 | 103.030 | 0.020415 | 3  | 12.295    |
| -0.4080273E 03 | 0.2561838E 03  | 0.4689656E 03 | 153.239 | 51.050  | 0.027125 | 4  | 16.393    |
| 0.2081957E 04  | -0.1588912E 04 | 0.2863277E 04 | 326.294 | 81.574  | 0.136555 | 5  | 20.492    |
| -0.6392061E 02 | -0.1249058E 04 | 0.4747454E 04 | 244.313 | 48.862  | 0.070336 | 6  | 24.590    |
| 0.2667852E 02  | -0.7114956E 03 | 0.7149370E 03 | 272.941 | 45.490  | 0.034097 | 7  | 28.689    |
| 0.5494604E 02  | -0.4072766E 02 | 0.5509673E 03 | 355.761 | 50.823  | 0.026277 | 8  | 32.787    |
| 0.1495524E 04  | -0.1528393E 04 | 0.2140459E 04 | 314.435 | 39.304  | 0.102082 | 9  | 36.885    |
| -0.1717542E 04 | 0.1623459E 04  | 0.1547031E 04 | 149.012 | 16.557  | 0.095271 | 10 | 40.984    |
| -0.2581543E 03 | -0.1503910E 03 | 0.2987659E 03 | 210.223 | 21.022  | 0.014249 |    |           |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 472 CTR 527 FLT 609.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2994947E 03  |                |               |         |        |          | 1  | 4.098     |
| 0.1509756E 04  | 0.1389935E 04  | 0.2052142E 04 | 42.634  | 42.634 | 0.912309 | 2  | 8.197     |
| -0.1470346E 04 | 0.1054232E 04  | 0.2234696E 04 | 151.852 | 75.926 | 1.000000 | 3  | 12.295    |
| 0.4486104E 02  | -0.6503657E 03 | 0.6519324E 03 | 273.948 | 91.316 | 0.251732 | 4  | 16.393    |
| -0.4789753E 02 | -0.3208496E 02 | 0.4877498E 03 | 190.862 | 47.721 | 0.218267 | 5  | 20.492    |
| 0.1382445E 04  | 0.2021211E 03  | 0.1416050E 04 | 12.319  | 2.464  | 0.633665 | 6  | 24.590    |
| 0.1135930E 04  | -0.3477294E 03 | 0.1196108E 04 | 347.210 | 57.202 | 0.530948 | 7  | 28.689    |
| 0.7556116E 02  | -0.2518720E 03 | 0.2629629E 03 | 286.699 | 40.957 | 0.117673 | 8  | 32.787    |
| 0.1472593E 03  | 0.9720771E 03  | 0.9831680E 03 | 81.386  | 10.173 | 0.439956 | 9  | 36.885    |
| -0.3406680E 03 | -0.1095752E 03 | 0.3578564E 03 | 197.530 | 21.981 | 0.160136 | 10 | 40.984    |
| -0.1134436E 03 | -0.1600546E 03 | 0.1961849E 03 | 234.673 | 23.467 | 0.027790 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 10 V= 200.5 KTS n= 1.35 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CIP 532 FLT 609.0 TR 31  
OVERALL CYCLIC LOAD = 0.274766F 01

ZERO POSITION USED 3.90 LOAD/IN USED 10.48

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2147012F 01  | -0.1146056F 01 | 0.2624392E 01 | 334.358 | 334.058 | 1.000000 | 1  | 4.098     |
| 0.2355558F 01  | -0.2196145F 01 | 0.3662022E 01 | 216.733 | 108.356 | 0.137538 | 2  | 8.197     |
| -0.2914277E 01 | 0.1437381F 02  | 0.4317129F 01 | 1.964   | 0.623   | 0.016451 | 3  | 12.295    |
| 0.4315334F 01  | -0.5547412F 01 | 0.5612164F 01 | 279.362 | 69.766  | 0.021386 | 4  | 16.393    |
| 0.8819710F 02  | -0.2657277F 01 | 0.3107133F 01 | 243.445 | 47.729  | 0.011843 | 5  | 20.492    |
| -0.1817301F 01 | 0.2652810F 02  | 0.4053194E 02 | 154.031 | 25.672  | 0.002308 | 6  | 24.590    |
| -0.5446424F 02 | 0.3050812F 02  | 0.3047484F 02 | 36.264  | 12.324  | 0.001176 | 7  | 28.689    |
| 0.2010393F 03  | -0.2716052F 02 | 0.4333324F 02 | 317.213 | 39.652  | 0.001536 | 8  | 32.787    |
| 0.2552245F 02  | -0.1348935F 02 | 0.4184685F 02 | 198.806 | 27.090  | 0.001595 | 9  | 36.885    |
| -0.1351295F 02 | 0.1635964F 02  | 0.2082107F 02 | 175.426 | 12.593  | 0.000793 | 10 | 40.984    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CIP 532 FLT 609.0 TR 36  
OVERALL CYCLIC LOAD = 0.208812F 06

ZERO POSITION USED 4.88 LOAD/IN USED -215359.80

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.0470533F 04 | 0.1239052F 06  | 0.1876193F 05 | 139.358 | 139.358 | 1.000000 | 1  | 4.098     |
| -0.1436810F 06 | -0.2069432E 04 | 0.2842522E 05 | 226.250 | 113.125 | 0.015254 | 2  | 8.197     |
| -0.2030714F 04 | 0.3517777F 04  | 0.1035819F 05 | 143.336 | 47.827  | 0.053044 | 3  | 12.295    |
| -0.3036355F 04 | 0.2448123F 04  | 0.3375257E 05 | 133.481 | 33.345  | 0.016218 | 4  | 16.393    |
| -0.2112114F 04 | 0.3510704F 04  | 0.4030411F 05 | 22.807  | 4.961   | 0.047763 | 5  | 20.492    |
| 0.8347401F 04  | -0.4068086F 05 | 0.4716177E 05 | 200.684 | 43.447  | 0.002503 | 6  | 24.590    |
| -0.7381323F 02 | -0.1234025F 04 | 0.2607357E 05 | 332.333 | 47.476  | 0.014314 | 7  | 28.689    |
| 0.2359482F 04  | -0.1178494F 04 | 0.1435773E 05 | 234.903 | 29.370  | 0.007577 | 8  | 32.787    |
| -0.2242022F 05 | 0.1409946F 05  | 0.1033061F 05 | 169.605 | 18.845  | 0.003435 | 9  | 36.885    |
| -0.1011740F 04 | 0.1305563F 05  | 0.1743055F 05 | 96.495  | 1.849   | 0.000920 | 10 | 40.984    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CIP 532 FLT 609.0 TR 11  
OVERALL CYCLIC LOAD = 0.686448E 03

ZERO POSITION USED 0.52 LOAD/IN USED 2195.00

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1638537F 01 | -0.5710767F 02 | 0.1385319E 03 | 204.382 | 204.382 | 0.261767 | 1  | 4.098     |
| -0.1261777F 03 | -0.3225387F 03 | 0.4716182E 03 | 319.035 | 159.517 | 1.000000 | 2  | 8.197     |
| 0.3712283F 03  | 0.4804475F 02  | 0.4243234E 02 | 111.534 | 37.178  | 0.176933 | 3  | 12.295    |
| -0.2290473F 02 | 0.1324916F 01  | 0.1324916F 03 | 270.702 | 67.675  | 0.269318 | 4  | 16.393    |
| 0.1621681F 01  | -0.1613411F 02 | 0.7725561E 02 | 107.903 | 33.541  | 0.157143 | 5  | 20.492    |
| -0.7554041F 02 | 0.1023875F 03  | 0.1124412E 03 | 114.438 | 19.373  | 0.223716 | 6  | 24.590    |
| -0.2147394F 02 | 0.2140551E 02  | 0.3005788F 02 | 159.226 | 19.413  | 0.081531 | 7  | 28.689    |
| 0.3384745F 01  | 0.1037413F 01  | 0.3248117E 01 | 17.976  | 2.747   | 0.005437 | 8  | 32.787    |
| 0.7574260F 01  | -0.2659075F 02 | 0.2761015E 02 | 289.923 | 41.769  | 0.056162 | 9  | 36.885    |
| -0.9428721F 01 | 0.1824368F 02  | 0.2058176E 02 | 117.453 | 11.745  | 0.061865 | 10 | 40.984    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CIP 532 FLT 609.0 TR 1  
OVERALL CYCLIC LOAD = 0.474139E 05

ZERO POSITION USED 9.40 LOAD/IN USED 94830.00

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.3335707F 05 | 0.3424834F 05  | 0.4784965E 05 | 133.055 | 133.055 | 1.000000 | 1  | 4.098     |
| -0.3202271F 05 | -0.2687859F 05 | 0.2935195F 05 | 294.510 | 147.255 | 0.625911 | 2  | 8.197     |
| 0.1214727F 05  | 0.2117550F 04  | 0.2240334E 05 | 63.813  | 21.273  | 0.050770 | 3  | 12.295    |
| 0.1057047F 04  | -0.2781455F 04 | 0.4705707F 04 | 216.234 | 54.059  | 0.100246 | 4  | 16.393    |
| -0.3744552F 04 | 0.2355473F 03  | 0.1833777F 04 | 7.373   | 1.476   | 0.004200 | 5  | 20.492    |
| 0.1593031F 04  | -0.3232615F 03 | 0.1933334F 04 | 350.733 | 58.455  | 0.042411 | 6  | 24.590    |
| 0.6076611F 03  | 0.8420748F 03  | 0.4955111E 03 | 64.166  | 9.157   | 0.010951 | 7  | 28.689    |
| 0.8467222F 02  | 0.1061147F 04  | 0.1064706F 05 | 65.159  | 10.645  | 0.022709 | 8  | 32.787    |
| -0.2589630F 03 | -0.2352865F 03 | 0.3304512F 03 | 214.203 | 24.245  | 0.008113 | 9  | 36.885    |
| -0.1574291F 03 | -0.3211680F 03 | 0.3574950F 03 | 243.815 | 24.331  | 0.017132 | 10 | 40.984    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 10 V= 200.5 KTS n= 1.35 g

## FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AH-64A SHIP 1009 T 472 CTR 532 FLT 609.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.4431573E 05  | 0.8419600E 05  | 0.9151431E 05 | 105.472 | 105.472 | 1.000000 | 1  | 4.098     |
| -0.2441281E 05 | -0.2131981E 05 | 0.5588316E 04 | 180.839 | 90.419  | 0.041065 | 2  | 8.197     |
| -0.5587717E 04 | -0.7830172E 04 | 0.8151148E 04 | 253.887 | 84.622  | 0.089070 | 3  | 12.295    |
| -0.2264873E 04 | 0.7363436E 02  | 0.1385730E 04 | 171.952 | 44.238  | 0.015144 | 4  | 16.393    |
| 0.2447344E 04  | 0.6381254E 03  | 0.2518121E 04 | 12.645  | 2.529   | 0.031887 | 5  | 20.492    |
| 0.3137824E 04  | -0.2023755E 03 | 0.3194274E 04 | 559.354 | 59.393  | 0.034905 | 6  | 24.590    |
| 0.1395738E 04  | 0.5335007E 03  | 0.1959335E 04 | 14.718  | 2.245   | 0.021520 | 7  | 28.689    |
| 0.8491730E 03  | 0.7955620E 03  | 0.1178746E 04 | 42.468  | 5.100   | 0.012876 | 8  | 32.787    |
| 0.4009041E 03  | 0.6593223E 03  | 0.7716411E 03 | 53.695  | 6.522   | 0.009432 | 9  | 36.885    |
| 0.5510560E 02  | -0.5955281E 02 | 0.7418477E 02 | 318.076 | 31.608  | 0.000411 | 10 | 40.984    |

## BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AH-64A SHIP 1009 T 472 CTR 532 FLT 609.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.9082242E 03  | -0.4075525E 04 | 0.5573117E 04 | 313.076 | 313.076 | 0.891311 | 1  | 4.098     |
| -0.3809675E 04 | 0.6034773E 04  | 0.6250332E 04 | 105.378 | 52.58   | 1.000000 | 2  | 8.197     |
| 0.1612301E 04  | 0.1507349E 04  | 0.2207173E 04 | 43.073  | 14.358  | 0.352678 | 3  | 12.295    |
| 0.5001057E 02  | -0.3051011E 03 | 0.5064317E 03 | 273.163 | 68.291  | 0.144544 | 4  | 16.393    |
| 0.1403914E 02  | 0.4561714E 03  | 0.4561717E 03 | 88.247  | 17.667  | 0.072925 | 5  | 20.492    |
| -0.2534715E 02 | -0.1572504E 03 | 0.1542324E 03 | 263.953 | 43.692  | 0.025443 | 6  | 24.590    |
| 0.2136887E 03  | 0.3756878E 03  | 0.4335150E 03 | 59.785  | 8.541   | 0.069630 | 7  | 28.689    |
| -0.3534021E 03 | 0.8451323E 03  | 0.7517507E 03 | 121.762 | 15.220  | 0.121240 | 8  | 32.787    |
| -0.4539990E 03 | 0.5352582E 02  | 0.4839603E 03 | 173.550 | 19.294  | 0.077332 | 9  | 36.885    |
| -0.5012791E 03 | -0.4852254E 03 | 0.6576655E 03 | 224.085 | 22.409  | 0.111510 | 10 | 40.984    |

## BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AH-64A SHIP 1009 T 472 CTR 532 FLT 609.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2436270E 05  | 0.2291296E 05  | 0.2426269E 05 | 109.329 | 109.329 | 1.000000 | 1  | 4.098     |
| -0.1802740E 04 | -0.2381554E 04 | 0.2381586E 04 | 269.702 | 134.851 | 0.096077 | 2  | 8.197     |
| -0.1236127E 02 | 0.4979656E 03  | 0.5649357E 03 | 118.176 | 39.393  | 0.023265 | 3  | 12.295    |
| -0.2667717E 03 | -0.1959635E 04 | 0.3419834E 04 | 325.054 | 81.265  | 0.140834 | 4  | 16.393    |
| 0.2503393E 04  | -0.4844873E 03 | 0.5344778E 03 | 245.022 | 49.004  | 0.022011 | 5  | 20.492    |
| -0.2256951E 03 | -0.1371660E 04 | 0.1864184E 04 | 227.375 | 37.896  | 0.076770 | 6  | 24.590    |
| -0.1262431E 04 | 0.1624025E 04  | 0.1576835E 04 | 40.474  | 5.782   | 0.065019 | 7  | 28.689    |
| 0.1201001E 04  | 0.4921834E 03  | 0.8122310E 03 | 142.702 | 17.838  | 0.023449 | 8  | 32.787    |
| -0.6441228E 03 | -0.2914978E 03 | 0.9536026E 03 | 157.799 | 21.978  | 0.034271 | 9  | 36.885    |
| -0.4222073E 03 | -0.3145135E 03 | 0.5266560E 03 | 216.710 | 21.671  | 0.021669 | 10 | 40.984    |

## BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AH-64A SHIP 1009 T 472 CTR 532 FLT 609.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.3694244E 03  | 0.1946694E 04  | 0.2706215E 04 | 45.956  | 45.956 | 1.000000 | 1  | 4.098     |
| 0.1882766E 04  | 0.1184736E 04  | 0.2682601E 04 | 153.792 | 76.896 | 0.400542 | 2  | 8.197     |
| -0.2406812E 04 | -0.4268438E 03 | 0.4368438E 03 | 271.507 | 90.502 | 0.161359 | 3  | 12.295    |
| 0.1149089E 07  | -0.1848431E 03 | 0.3250721E 03 | 214.995 | 53.749 | 0.120331 | 4  | 16.393    |
| -0.2669448E 03 | 0.3324976E 03  | 0.1205400E 04 | 16.012  | 3.202  | 0.445090 | 5  | 20.492    |
| 0.1150025E 04  | -0.6898099E 02 | 0.1238400E 04 | 357.808 | 50.468 | 0.457275 | 6  | 24.590    |
| 0.1256474E 04  | 0.1051828E 03  | 0.1444151E 02 | 46.335  | 6.905  | 0.053473 | 7  | 28.689    |
| 0.4527010E 02  | 0.7138245E 03  | 0.7741345E 03 | 112.893 | 14.112 | 0.026113 | 8  | 32.787    |
| -0.2431199E 03 | -0.1850524E 03 | 0.3050941E 03 | 217.254 | 24.159 | 0.112677 | 9  | 36.885    |
| 0.1712408E 02  | -0.4027357E 02 | 0.6265942E 02 | 285.860 | 28.586 | 0.023137 | 10 | 40.984    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 11 V= 199 KTS n= 1.62 g

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## BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 538 FLT 609.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.5156751E 03  |                |               |         |         |          | 1  | 4.115     |
| 0.4505005E 04  | -0.5064953E 04 | 0.6779301E 04 | 311.646 | 311.646 | 0.006676 | 2  | 8.230     |
| -0.1671544E 04 | 0.7460770E 04  | 0.7465727E 04 | 102.629 | 51.314  | 1.000000 | 3  | 12.346    |
| 0.1662651E 04  | 0.1069362E 04  | 0.2234035E 04 | 78.577  | 9.526   | 0.29310  | 4  | 16.461    |
| -0.2138980E 03 | -0.3677117E 03 | 0.4511024E 03 | 239.248 | 59.312  | 0.099011 | 5  | 20.576    |
| -0.4733670E 03 | 0.1204255E 03  | 0.1293710E 03 | 111.457 | 22.721  | 0.316924 | 6  | 24.691    |
| 0.3832630E 03  | -0.1215086E 03 | 0.4021626E 03 | 342.354 | 57.059  | 0.052600 | 7  | 28.807    |
| 0.3182540E 03  | 0.1693017E 03  | 0.5981540E 03 | 49.155  | 7.022   | 0.043347 | 8  | 32.922    |
| -0.3357434E 03 | 0.4211704E 03  | 0.4211794E 03 | 50.249  | 11.794  | 0.137404 | 9  | 37.037    |
| -0.7066187E 03 | 0.2011830E 03  | 0.7248270E 03 | 164.112 | 10.235  | 0.076118 | 10 | 41.152    |
| -0.5072105E 03 | -0.2003930E 03 | 0.5454543E 03 | 201.577 | 20.150  | 0.071341 |    |           |

## FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 538 FLT 609.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.4332301E 05  |                |               |         |         |          | 1  | 4.115     |
| -0.1776219E 05 | 0.9894804E 05  | 0.1035591E 06 | 133.173 | 133.173 | 1.000000 | 2  | 8.230     |
| -0.8622164E 04 | -0.1071050E 04 | 0.8603434E 04 | 197.061 | 93.541  | 0.046393 | 3  | 12.346    |
| -0.2335747E 04 | -0.1225400E 04 | 0.1247453E 05 | 259.208 | 86.493  | 0.174049 | 4  | 16.461    |
| -0.1684517E 04 | 0.2334791E 04  | 0.1637377E 04 | 171.453 | 42.862  | 0.015983 | 5  | 20.576    |
| 0.6446337E 03  | 0.1551303E 04  | 0.7120127E 03 | 12.683  | 2.537   | 0.037080 | 6  | 24.691    |
| 0.1586794E 04  | -0.1173228E 04 | 0.2281950E 04 | 374.144 | 54.457  | 0.027687 | 7  | 28.807    |
| 0.1172105E 03  | -0.4242427E 03 | 0.4420558E 03 | 255.378 | 40.768  | 0.036344 | 8  | 32.922    |
| 0.1630521E 03  | 0.3715850E 03  | 0.4057873E 03 | 61.309  | 6.289   | 0.034035 | 9  | 37.037    |
| 0.4639394E 03  | 0.6337947E 02  | 0.4715650E 03 | 7.267   | 3.310   | 0.036713 | 10 | 41.152    |
| 0.3732335E 02  | -0.8505615E 02 | 0.9339328E 02 | 293.973 | 29.397  | 0.030926 |    |           |

## BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 538 FLT 609.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2441143E 05  |                |               |         |         |          | 1  | 4.115     |
| -0.6600438E 04 | 0.2515026E 05  | 0.2606195E 05 | 104.705 | 104.705 | 1.000000 | 2  | 8.230     |
| -0.1952948E 04 | -0.1219463E 04 | 0.2356902E 04 | 214.044 | 107.022 | 0.090643 | 3  | 12.346    |
| 0.2371463E 03  | -0.2975670E 04 | 0.2985304E 04 | 274.556 | 91.519  | 0.114811 | 4  | 16.461    |
| 0.2027290E 04  | -0.6054548E 03 | 0.3087329E 04 | 248.790 | 97.173  | 0.118735 | 5  | 20.576    |
| -0.4521086E 03 | -0.9505581E 02 | 0.1052598E 04 | 244.563 | 48.913  | 0.040461 | 6  | 24.691    |
| -0.9882541E 03 | -0.5692334E 03 | 0.1140471E 04 | 209.947 | 34.990  | 0.043861 | 7  | 28.807    |
| 0.1332112E 04  | 0.3274788E 02  | 0.1332514E 04 | 1.408   | 0.701   | 0.051247 | 8  | 32.922    |
| 0.1372334E 04  | -0.5378233E 03 | 0.1432066E 04 | 337.941 | 42.243  | 0.055075 | 9  | 37.037    |
| -0.1470459E 04 | -0.3111956E 03 | 0.1512779E 04 | 193.580 | 21.509  | 0.058179 | 10 | 41.152    |
| -0.1964162E 03 | -0.2101880E 03 | 0.2841929E 03 | 239.253 | 23.925  | 0.014776 |    |           |

## BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 538 FLT 609.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.6176614E 03  |                |               |         |        |          | 1  | 4.115     |
| 0.2445977E 04  | 0.2261532E 04  | 0.3049580E 04 | 43.097  | 43.097 | 1.000000 | 2  | 8.230     |
| -0.2605151E 04 | 0.1784060E 04  | 0.3157450E 04 | 145.596 | 72.798 | 0.942649 | 3  | 12.346    |
| -0.7627091E 02 | -0.5247798E 03 | 0.5297913E 03 | 261.728 | 97.243 | 0.158166 | 4  | 16.461    |
| -0.3242217E 03 | -0.1267061E 03 | 0.3513294E 03 | 201.108 | 50.277 | 0.105040 | 5  | 20.576    |
| 0.9471902E 03  | 0.9292712E 02  | 0.9517395E 03 | 5.604   | 1.121  | 0.284137 | 6  | 24.691    |
| 0.1229102E 04  | -0.4260043E 03 | 0.1296895E 04 | 341.132 | 56.855 | 0.387778 | 7  | 28.807    |
| 0.2994766E 03  | 0.1213526E 03  | 0.3231296E 03 | 22.055  | 3.151  | 0.096469 | 8  | 32.922    |
| -0.6060519E 02 | 0.8952837E 03  | 0.8973325E 03 | 93.873  | 11.734 | 0.267894 | 9  | 37.037    |
| -0.2316654E 03 | -0.1624467E 02 | 0.2324411E 03 | 184.033 | 20.448 | 0.069344 | 10 | 41.152    |
| -0.1779443E 02 | -0.1003626E 03 | 0.1019289E 03 | 259.946 | 25.995 | 0.030430 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 11 V= 199 KTS n= 1.62 g

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## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 538 FLT 609.0 TR 31

| AJ             | U              | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.160277-01    |                |               |         |         |          | 1  | 4.115     |
| 0.10297567-01  | -0.12850177-01 | 0.32397418-01 | 337.045 | 337.045 | 1.000000 | 2  | 8.230     |
| -0.20767700-00 | -0.23448900-00 | 0.31322770-00 | 278.473 | 114.235 | 0.395213 | 3  | 12.346    |
| -0.24048700-01 | 0.56732400-02  | 0.24697090-01 | 166.017 | 35.636  | 0.307508 | 4  | 16.461    |
| -0.37020100-02 | -0.47513200-01 | 0.67593370-01 | 277.200 | 54.800  | 0.20547  | 5  | 20.576    |
| -0.32503100-01 | -0.11794300-01 | 0.25436320-01 | 237.573 | 41.532  | 0.007721 | 6  | 24.691    |
| -0.33073100-02 | 0.49506800-02  | 0.10986770-01 | 109.623 | 18.270  | 0.003366 | 7  | 28.807    |
| -0.67673700-02 | -0.13770700-02 | 0.80124600-02 | 191.304 | 27.329  | 0.002398 | 8  | 32.922    |
| -0.54473300-02 | 0.10407500-02  | 0.55454710-02 | 169.148 | 21.143  | 0.001636 | 9  | 37.037    |
| -0.33555400-02 | -0.13914370-02 | 0.30326950-02 | 202.522 | 22.002  | 0.001194 | 10 | 41.152    |
| -0.34566000-02 | 0.26131070-02  | 0.44547710-02 | 140.890 | 14.049  | 0.001354 |    |           |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 538 FLT 609.0 TR 36

| AJ             | U              | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.44922020-04 |                |               |         |         |          | 1  | 4.115     |
| -0.16244490-00 | 0.13306920-00  | 0.22382140-00 | 143.895 | 143.895 | 1.000000 | 2  | 8.230     |
| -0.11045000-00 | -0.17036010-00 | 0.20304010-00 | 237.043 | 118.521 | 0.508991 | 3  | 12.346    |
| 0.12671770-00  | 0.16276340-00  | 0.20752720-00 | 21.666  | 17.222  | 0.009190 | 4  | 16.461    |
| -0.27867510-00 | 0.20136050-00  | 0.30011550-00 | 134.725 | 33.681  | 0.017537 | 5  | 20.576    |
| 0.60427110-00  | 0.20731700-00  | 0.63364530-00 | 15.436  | 3.787   | 0.028290 | 6  | 24.691    |
| 0.17050200-00  | -0.15156070-00 | 0.10005330-00 | 335.107 | 55.851  | 0.008328 | 7  | 28.807    |
| 0.27950350-00  | -0.11617040-00 | 0.30776110-00 | 337.396 | 48.199  | 0.013407 | 8  | 32.922    |
| -0.12152010-00 | -0.05566740-00 | 0.13427090-00 | 208.499 | 26.062  | 0.006124 | 9  | 37.037    |
| -0.69374000-00 | 0.10000140-00  | 0.20969730-00 | 134.512 | 14.990  | 0.004383 | 10 | 41.152    |
| 0.36462070-00  | -0.30937020-00 | 0.49752740-00 | 321.550 | 32.155  | 0.002203 |    |           |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 538 FLT 609.0 TR 11

| AJ             | U              | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.28949370-00 |                |               |         |         |          | 1  | 4.115     |
| -0.15353130-00 | -0.12444700-00 | 0.19434260-00 | 219.334 | 219.334 | 0.344253 | 2  | 8.230     |
| 0.15312180-00  | -0.40564000-00 | 0.54083890-00 | 310.762 | 155.381 | 1.000000 | 3  | 12.346    |
| 0.23112910-00  | 0.30534800-00  | 0.39272090-00 | 52.849  | 17.616  | 0.010765 | 4  | 16.461    |
| -0.24641400-00 | -0.13665500-00 | 0.14475170-00 | 253.443 | 62.464  | 0.271342 | 5  | 20.576    |
| -0.24554540-00 | 0.17703500-00  | 0.44630530-00 | 159.172 | 31.034  | 0.042088 | 6  | 24.691    |
| -0.24580150-00 | 0.00301100-00  | 0.10002240-00 | 121.553 | 20.260  | 0.107144 | 7  | 28.807    |
| -0.15125130-00 | 0.29442040-00  | 0.45157930-00 | 123.071 | 17.582  | 0.045077 | 8  | 32.922    |
| 0.14020710-00  | 0.13545000-00  | 0.37330500-00 | 21.324  | 2.666   | 0.006513 | 9  | 37.037    |
| -0.27051900-00 | -0.20877210-00 | 0.30775480-00 | 244.993 | 29.444  | 0.057313 | 10 | 41.152    |
| 0.20163650-00  | 0.10200570-00  | 0.22947620-00 | 26.525  | 2.453   | 0.042434 |    |           |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 538 FLT 609.0 TR 1

| AJ             | U              | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.24105170-00 |                |               |         |         |          | 1  | 4.115     |
| -0.39180140-00 | 0.36111300-00  | 0.53283290-00 | 137.334 | 137.334 | 1.000000 | 2  | 8.230     |
| 0.10428240-00  | -0.31591600-00 | 0.33263610-00 | 280.263 | 144.132 | 0.624391 | 3  | 12.346    |
| 0.15333900-00  | 0.98719730-00  | 0.17715600-00 | 30.053  | 10.018  | 0.333248 | 4  | 16.461    |
| -0.40305070-00 | -0.15340150-00 | 0.42923400-00 | 203.937 | 50.734  | 0.080566 | 5  | 20.576    |
| 0.18427740-00  | -0.11036210-00 | 0.21579300-00 | 329.083 | 65.817  | 0.340312 | 6  | 24.691    |
| 0.16715440-00  | 0.33291240-00  | 0.19313180-00 | 10.084  | 1.441   | 0.035483 | 7  | 28.807    |
| 0.13489000-00  | 0.56734390-00  | 0.15049510-00 | 25.323  | 3.760   | 0.028244 | 8  | 32.922    |
| 0.32925810-00  | 0.11421000-00  | 0.11386220-00 | 73.918  | 9.240   | 0.022308 | 9  | 37.037    |
| -0.57211180-00 | 0.11805920-00  | 0.58434540-00 | 148.254 | 18.695  | 0.010967 | 10 | 41.152    |
| -0.54545940-00 | -0.38533750-00 | 0.30967430-00 | 261.953 | 26.195  | 0.007313 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 12 V= 204.5 KTS n= 1.23 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 404 FLT 609.0 TR 31

| AJ             | PJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.3035050E-01  |                |               |         |         |          | 1  | 4.082     |
| 0.3511777E-01  | -0.2504627E-01 | 0.4650752E-01 | 325.044 | 325.044 | 1.000000 | 2  | 8.163     |
| -0.3767414E-01 | -0.3716413E-01 | 0.5291551E-01 | 224.610 | 112.305 | 0.113787 | 3  | 12.245    |
| 0.7825720E-01  | 0.3455615E-01  | 0.8556336E-01 | 23.849  | 7.450   | 0.016398 | 4  | 16.327    |
| -0.5630171E-01 | -0.1161325E-01 | 0.1250603E-01 | 244.136 | 61.634  | 0.027750 | 5  | 20.406    |
| -0.4528175E-02 | 0.2342355E-01  | 0.2528762E-01 | 112.157 | 22.427  | 0.005437 | 6  | 24.490    |
| 0.1516349E-01  | 0.1806454E-01  | 0.2353502E-01 | 49.933  | 8.330   | 0.005072 | 7  | 28.571    |
| 0.5213439E-02  | 0.5327230E-02  | 0.7454146E-02 | 45.616  | 6.517   | 0.001603 | 8  | 32.653    |
| 0.1245773E-01  | 0.5556544E-02  | 0.1382560E-01 | 25.734  | 3.213   | 0.002973 | 9  | 36.735    |
| 0.1594153E-02  | 0.1110822E-01  | 0.1122775E-01 | 31.803  | 9.090   | 0.002413 | 10 | 40.816    |
| 0.1734127E-01  | -0.3143540E-02 | 0.1782543E-01 | 346.561 | 34.656  | 0.003434 |    |           |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 404 FLT 609.0 TR 36

| AJ             | PJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.5766537E-04 |                |               |         |         |          | 1  | 4.082     |
| -0.7710105E-05 | 0.1436784E-06  | 0.1630305E-06 | 114.237 | 118.237 | 1.000000 | 2  | 8.163     |
| -0.7494472E-05 | 0.1061202E-04  | 0.1244172E-04 | 125.245 | 62.623  | 0.007468 | 3  | 12.245    |
| -0.4025123E-05 | 0.1474514E-05  | 0.1474517E-05 | 91.564  | 30.521  | 0.00396  | 4  | 16.327    |
| -0.1200514E-04 | -0.1724427E-05 | 0.1213135E-04 | 186.169 | 47.042  | 0.007440 | 5  | 20.406    |
| 0.4432447E-05  | 0.3793768E-04  | 0.7417131E-04 | 76.361  | 5.268   | 0.045449 | 6  | 24.490    |
| 0.3949367E-05  | -0.5803355E-05 | 0.6417171E-05 | 32.445  | 51.414  | 0.003435 | 7  | 28.571    |
| 0.1220448E-04  | -0.1527105E-04 | 0.2277121E-04 | 302.406 | 43.201  | 0.013964 | 8  | 32.653    |
| 0.4124467E-05  | -0.7115506E-05 | 0.3276572E-05 | 294.891 | 37.486  | 0.005075 | 9  | 36.735    |
| -0.3436742E-04 | -0.3535171E-05 | 0.3455415E-04 | 185.870 | 20.652  | 0.021197 | 10 | 40.816    |
| 0.8713219E-05  | -0.8514306E-05 | 0.1214323E-04 | 315.661 | 31.566  | 0.007470 |    |           |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 404 FLT 609.0 TR 11

| AJ             | PJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1355034E-03 |                |               |         |         |          | 1  | 4.082     |
| -0.2626355E-03 | 0.3564051E-02  | 0.2650471E-03 | 172.272 | 172.272 | 0.485531 | 2  | 8.163     |
| 0.4627383E-03  | -0.2640058E-02 | 0.5450511E-03 | 327.959 | 163.980 | 1.000000 | 3  | 12.245    |
| 0.3094304E-02  | 0.4000250E-02  | 0.5754508E-02 | 24.236  | 8.079   | 0.178791 | 4  | 16.327    |
| 0.2335009E-02  | -0.1765603E-02 | 0.1733403E-02 | 277.579 | 69.395  | 0.327173 | 5  | 20.406    |
| -0.3768077E-02 | -0.1672019E-02 | 0.4123143E-02 | 233.525 | 40.785  | 0.075530 | 6  | 24.490    |
| -0.5078933E-02 | 0.7200050E-02  | 0.8866542E-02 | 124.951 | 20.825  | 0.162407 | 7  | 28.571    |
| 0.5749037E-01  | 0.1363073E-02  | 0.1476576E-02 | 57.203  | 9.606   | 0.021086 | 8  | 32.653    |
| 0.7773057E-01  | 0.1591050E-02  | 0.2103150E-02 | 63.278  | 8.535   | 0.036473 | 9  | 36.735    |
| 0.1756121E-02  | -0.1405855E-02 | 0.2269053E-02 | 323.130 | 39.576  | 0.041932 | 10 | 40.816    |
| -0.4423867E-01 | -0.1401300E-01 | 0.4453060E-01 | 143.616 | 14.442  | 0.003300 |    |           |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 404 FLT 609.0 TR 1

| AJ             | PJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.4011314E-05 |                |               |         |         |          | 1  | 4.082     |
| -0.1400000E-05 | 0.1400000E-05  | 0.4244140E-05 | 110.065 | 110.065 | 1.000000 | 2  | 8.163     |
| 0.1071000E-05  | -0.1400000E-05 | 0.2744517E-05 | 291.762 | 145.881 | 0.646754 | 3  | 12.245    |
| 0.4138751E-04  | 0.1804555E-04  | 0.5633715E-04 | 43.171  | 14.590  | 0.132741 | 4  | 16.327    |
| -0.3638712E-04 | -0.2717000E-04 | 0.4623150E-04 | 217.052 | 54.263  | 0.106930 | 5  | 20.406    |
| 0.1115232E-04  | 0.1117443E-04  | 0.2420863E-04 | 27.132  | 5.820   | 0.057040 | 6  | 24.490    |
| 0.1547000E-04  | -0.1547000E-04 | 0.1547000E-04 | 33.163  | 33.163  | 0.100000 | 7  | 28.571    |
| 0.6513032E-03  | 0.6277751E-03  | 0.1057742E-03 | 36.426  | 5.201   | 0.024422 | 8  | 32.653    |
| 0.9567640E-03  | 0.1002702E-03  | 0.1471704E-03 | 47.368  | 5.921   | 0.034576 | 9  | 36.735    |
| -0.8324444E-03 | -0.4059470E-03 | 0.4183213E-03 | 253.916 | 28.724  | 0.005356 | 10 | 40.816    |
| -0.2732651E-03 | -0.1255555E-03 | 0.3024409E-03 | 205.372 | 20.537  | 0.007126 |    |           |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 12 V= 204.5 KTS n= 1.23 g

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 404 FLT 609.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| J.541092CE C5  |                |               |         |        |          |    |           |
| -J.1940309E C5 | 0.1102476E C4  | 0.1119514E C6 | 99.978  | 99.978 | 1.000000 | 1  | 4.082     |
| -J.2515641E C4 | -0.7261035E C3 | 0.2618527E C4 | 196.099 | 98.049 | 0.023382 | 2  | 8.163     |
| -0.3685955E C4 | -0.7261035E C4 | 0.8148570E C4 | 243.106 | 81.035 | 0.072761 | 3  | 12.245    |
| -0.1723570E C4 | 0.1450951E C4  | 0.2220819E C4 | 137.993 | 34.998 | 0.020152 | 4  | 16.327    |
| J.9060034E C3  | 0.2443610E C4  | 0.2443335E C4 | 69.055  | 13.611 | 0.071648 | 5  | 20.408    |
| 0.1240934E C4  | -0.3532500E C2 | 0.1349502E C4 | 343.059 | 57.176 | 0.012050 | 6  | 24.490    |
| -J.5772031E C3 | -0.1007811E C4 | 0.1214244E C4 | 230.102 | 33.729 | 0.010842 | 7  | 28.571    |
| -0.3529519E C3 | -0.1109604E C4 | J.1221659E C4 | 253.238 | 31.651 | 0.010939 | 8  | 32.653    |
| 0.3889355E C3  | 0.3180502E C2  | 0.8354729E C3 | 1.935   | 0.221  | 0.007942 | 9  | 36.735    |
| 0.5152500E C3  | -0.2175210E C2 | 0.5594514E C3 | 317.071 | 33.707 | 0.004945 | 10 | 40.816    |

BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 404 FLT 609.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| J.1335002E C4  |                |               |         |         |          |    |           |
| J.3975261E C4  | -0.3026543E C4 | 0.5382269E C4 | 317.611 | 317.611 | 0.893634 | 1  | 4.082     |
| -J.2114314E C4 | 0.5619617E C4  | 0.6022526E C4 | 110.551 | 55.276  | 1.000000 | 2  | 8.163     |
| 0.1201400E C4  | 0.4393301E C2  | 0.1269218E C4 | 18.015  | 6.272   | 0.210731 | 3  | 12.245    |
| J.2583345E C3  | -0.4745555E C3 | 0.1007169E C4 | 234.753 | 71.131  | J.167339 | 4  | 16.327    |
| -0.9715041E C2 | -0.4146140E C4 | 0.1018741E C3 | 200.433 | 41.266  | 0.016077 | 5  | 20.408    |
| J.2430649E C3  | 0.1351545E C3  | 0.2781794E C3 | 30.025  | 5.004   | 0.046187 | 6  | 24.490    |
| -0.3503353E C2 | -0.4355568E C2 | 0.4374739E C3 | 265.235 | 37.899  | 0.072635 | 7  | 28.571    |
| 0.3004471E C2  | 0.5615442E C3  | 0.1112403E C4 | 30.312  | 3.739   | 0.104728 | 8  | 32.653    |
| -0.4877304E C3 | -0.1862542E C2 | 0.5222708E C3 | 200.873 | 22.321  | 0.006714 | 9  | 36.735    |
| -J.2457567E C3 | -0.3703721E C2 | 0.4444505E C3 | 236.434 | 23.643  | 0.073870 | 10 | 40.816    |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 404 FLT 609.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2712041E C4  |                |               |         |         |          |    |           |
| -0.6267543E C4 | 0.2697790E C5  | 0.2783829E C5 | 104.282 | 104.282 | 1.000000 | 1  | 4.082     |
| -0.1411328E C2 | -0.8548528E C3 | 0.8545192E C3 | 270.946 | 135.473 | 0.030712 | 2  | 8.163     |
| -0.9620299E C3 | -0.8605471E C3 | 0.1291348E C4 | 221.789 | 73.430  | 0.046387 | 3  | 12.245    |
| 0.3566082E C4  | -0.6630311E C3 | 0.3627347E C4 | 349.455 | 87.364  | 0.130300 | 4  | 16.327    |
| 0.3582722E C3  | -0.1017711E C4 | 0.1676931E C4 | 269.394 | 57.679  | 0.028757 | 5  | 20.408    |
| 0.5717182E C3  | -0.2967977E C2 | 0.5730122E C3 | 356.040 | 59.348  | 0.020585 | 6  | 24.490    |
| 0.7526858E C3  | -0.3308567E C3 | 0.6221931E C3 | 376.271 | 48.039  | 0.029735 | 7  | 28.571    |
| 0.6536543E C3  | -0.1541204E C3 | 0.7008110E C3 | 347.296 | 43.412  | 0.025174 | 8  | 32.653    |
| -0.1872969E C4 | 0.2873506E C3  | 0.1894183E C4 | 171.278 | 19.031  | 0.068067 | 9  | 36.735    |
| 0.2883718E C3  | -0.2593499E C3 | 0.3871729E C3 | 318.143 | 31.914  | 0.013908 | 10 | 40.816    |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 404 FLT 609.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2609105E C3  |                |               |         |        |          |    |           |
| 0.2134534E C4  | 0.1876634E C4  | 0.2810718E C4 | 40.586  | 40.586 | 0.899527 | 1  | 4.082     |
| -0.2660078E C4 | 0.1639357E C4  | 0.3124611E C4 | 148.355 | 74.178 | 1.000000 | 2  | 8.163     |
| -0.4669004E C3 | -0.5354399E C3 | 0.7096973E C3 | 228.978 | 76.326 | 0.227128 | 3  | 12.245    |
| -0.5846513E C2 | -0.1463274E C3 | 0.4014292E C2 | 193.493 | 48.371 | 0.192478 | 4  | 16.327    |
| 0.1126087E C4  | 0.2155300E C3  | 0.1169457E C4 | 15.653  | 3.121  | 0.374267 | 5  | 20.408    |
| 0.1126566E C4  | -0.3976587E C3 | 0.1195869E C4 | 340.842 | 56.805 | 0.382720 | 6  | 24.490    |
| 0.1934952E C3  | -0.1026111E C3 | 0.2190192E C3 | 332.063 | 47.438 | 0.070094 | 7  | 28.571    |
| 0.3531840E C3  | 0.4468879E C3  | 0.1010413E C4 | 69.544  | 8.673  | 0.323431 | 8  | 32.653    |
| -0.3472244E C3 | -0.2804045E C2 | 0.5154155E C3 | 227.640 | 25.244 | 0.164451 | 9  | 36.735    |
| -0.5475372E C1 | -0.1075142E C3 | 0.1076536E C3 | 267.084 | 26.708 | 0.034453 | 10 | 40.816    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 13 V= 204.5 KTS n= 1.44 g

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## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 472 CTR 413 FLT 609.0 TR 31

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.0035715E 01  |                |               |         |         |          | 1  | 4.082     |
| 0.3637208E 01  | -0.2166854E 01 | 0.4547361E 01 | 322.490 | 322.490 | 1.000000 | 2  | 8.163     |
| -0.2725239E 00 | -0.3374532E 00 | 0.4444563E 00 | 232.675 | 116.337 | 0.098839 | 3  | 12.245    |
| -0.6769013E 01 | 0.3231589E 01  | 0.7500845E 01 | 154.430 | 51.493  | 0.016455 | 4  | 16.327    |
| 0.3338354E 01  | -0.8431144E 01 | 0.9089010E 01 | 291.612 | 72.900  | 0.019741 | 5  | 20.408    |
| 0.3757354E 01  | -0.2613564E 01 | 0.4022205E 01 | 319.475 | 63.655  | 0.038645 | 6  | 24.490    |
| -0.1557738E 01 | 0.2147033E 01  | 0.3157569E 01 | 119.556 | 19.926  | 0.006745 | 7  | 28.571    |
| -0.1195768E 02 | 0.3584516E 01  | 0.3586364E 01 | 91.719  | 13.103  | 0.001766 | 8  | 32.653    |
| -0.4627336E 02 | 0.4275405E 02  | 0.4647609E 02 | 174.721 | 21.840  | 0.001922 | 9  | 36.735    |
| -0.3715777E 01 | -0.3624466E 02 | 0.3733412E 01 | 185.571 | 20.619  | 0.008210 | 10 | 40.816    |
| 0.4115105E 02  | -0.6267301E 03 | 0.4162554E 02 | 351.360 | 35.134  | 0.000915 |    |           |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 472 CTR 413 FLT 609.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1032542E 05 |                |               |         |         |          | 1  | 4.082     |
| -0.1226675E 06 | 0.1411934E 06  | 0.1870019E 06 | 130.969 | 130.969 | 1.000000 | 2  | 8.163     |
| 0.4602126E 03  | -0.7815181E 03 | 0.9110393E 03 | 300.926 | 150.463 | 0.004872 | 3  | 12.245    |
| -0.4210305E 04 | -0.6446078E 04 | 0.1353344E 05 | 218.136 | 72.712  | 0.055820 | 4  | 16.327    |
| -0.5776257E 03 | 0.7974357E 03  | 0.9846624E 03 | 125.918 | 31.479  | 0.005266 | 5  | 20.408    |
| 0.6415233E 04  | 0.1716335E 04  | 0.6649844E 04 | 14.559  | 3.000   | 0.035507 | 6  | 24.490    |
| -0.4095654E 03 | -0.3660510E 03 | 0.5433054E 03 | 221.789 | 36.965  | 0.002937 | 7  | 28.571    |
| 0.3276854E 04  | -0.2032756E 04 | 0.5085013E 04 | 325.187 | 46.384  | 0.020621 | 8  | 32.653    |
| -0.7555577E 03 | -0.1291267E 04 | 0.1446034E 04 | 234.666 | 29.958  | 0.008000 | 9  | 36.735    |
| -0.1064644E 04 | -0.4770940E 03 | 0.1149743E 04 | 203.647 | 22.627  | 0.006362 | 10 | 40.816    |
| -0.2487542E 03 | -0.366516E 03  | 0.5723604E 03 | 230.761 | 23.076  | 0.002526 |    |           |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 472 CTR 413 FLT 609.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1932654E 03 |                |               |         |         |          | 1  | 4.082     |
| -0.1555024E 03 | 0.2656250E 02  | 0.1581550E 03 | 170.331 | 170.331 | 0.265771 | 2  | 8.163     |
| 0.4891001E 03  | -0.3232310E 03 | 0.5622568E 03 | 326.541 | 163.270 | 1.000000 | 3  | 12.245    |
| -0.1177383E 02 | -0.1229121E 03 | 0.1234754E 03 | 264.530 | 88.177  | 0.210617 | 4  | 16.327    |
| 0.2183124E 01  | -0.1341004E 03 | 0.1341182E 03 | 273.933 | 67.133  | 0.225170 | 5  | 20.408    |
| -0.6540454E 01 | -0.5763566E 02 | 0.8717888E 02 | 221.339 | 44.270  | 0.148704 | 6  | 24.490    |
| -0.3354637E 02 | 0.7350635E 02  | 0.8302504E 02 | 117.732 | 19.617  | 0.141619 | 7  | 28.571    |
| -0.3273115E 02 | 0.1431255E 02  | 0.3573655E 02 | 157.947 | 22.421  | 0.061046 | 8  | 32.653    |
| -0.5766315E 01 | 0.6453855E 01  | 0.8666001E 01 | 131.595 | 16.449  | 0.014816 | 9  | 36.735    |
| 0.1244525E 02  | -0.2442912E 02 | 0.2441653E 02 | 296.596 | 33.030  | 0.046765 | 10 | 40.816    |
| -0.2281464E 02 | -0.1056044E 02 | 0.2514021E 02 | 234.638 | 20.404  | 0.042683 |    |           |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 472 CTR 413 FLT 609.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.3219090E 05 |                |               |         |         |          | 1  | 4.082     |
| -0.2571236E 05 | 0.3570513E 05  | 0.4671750E 05 | 123.393 | 123.393 | 1.000000 | 2  | 8.163     |
| 0.1354564E 05  | -0.2316164E 05 | 0.2665130E 05 | 300.336 | 150.153 | 0.574759 | 3  | 12.245    |
| -0.1073384E 04 | -0.1406250E 04 | 0.1767134E 04 | 232.732 | 77.577  | 0.037826 | 4  | 16.327    |
| -0.2255763E 04 | -0.2553655E 04 | 0.3407469E 04 | 220.547 | 57.137  | 0.072938 | 5  | 20.408    |
| 0.1911001E 04  | -0.3574146E 03 | 0.1944137E 04 | 349.406 | 69.881  | 0.041615 | 6  | 24.490    |
| 0.1648337E 04  | 0.4990615E 03  | 0.1570516E 04 | 30.428  | 5.076   | 0.042188 | 7  | 28.571    |
| 0.6226345E 03  | 0.5578857E 03  | 0.6632156E 03 | 43.838  | 6.263   | 0.018477 | 8  | 32.653    |
| 0.3727753E 03  | 0.1323215E 04  | 0.1574726E 04 | 75.256  | 5.283   | 0.025426 | 9  | 36.735    |
| -0.3737731E 03 | 0.4872674E 03  | 0.3513614E 03 | 172.028 | 19.114  | 0.007521 | 10 | 40.816    |
| -0.2204779E 03 | -0.5574117E 03 | 0.5564382E 03 | 240.419 | 24.042  | 0.012831 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 13 V= 204.5 KTS n= 1.44 g

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 472 CTR 413 FLT 609.0 TR 3  
OVERALL CYCLIC LOAD = 0.121045 C6

| ZERO POSITION USED | E.31           | LOAD/IN USED  | 31779.81 |         |          |    |           |  |
|--------------------|----------------|---------------|----------|---------|----------|----|-----------|--|
| AJ                 | PJ             | CJ            | PHIJC    | PSIJC   | CJ/CJMAX | J  | FREQUENCY |  |
| 0.31070125 C5      |                |               |          |         |          |    |           |  |
| -0.12704565 C5     | 0.10373847 C6  | 0.1045208E 06 | 97.015   | 97.015  | 1.000000 | 1  | 4.082     |  |
| 0.37499635 C6      | -0.03042231 C6 | 0.7334770E 04 | 330.740  | 153.370 | 0.070175 | 2  | 8.163     |  |
| -0.70186200 C6     | -0.12957151 C6 | 0.1442012E 05 | 240.375  | 80.297  | 0.137970 | 3  | 12.245    |  |
| -0.13240722 C4     | 0.1162542E C4  | 1762000E 04   | 133.717  | 34.679  | 0.016858 | 4  | 16.327    |  |
| 0.22720121 C4      | 0.11381671 C4  | 0.2541650E 04 | 26.603   | 5.321   | 0.024318 | 5  | 20.408    |  |
| 0.25804620 C4      | -0.8103894E C2 | 0.2581752E 04 | 353.103  | 37.658  | 0.024701 | 6  | 24.490    |  |
| 0.24255550 C3      | -0.8603066E C3 | 0.8538466E 03 | 235.746  | 40.821  | 0.008552 | 7  | 28.571    |  |
| 0.39225107 C3      | -0.2450086E C3 | 0.4625232E 03 | 323.032  | 41.000  | 0.004425 | 8  | 32.653    |  |
| 0.1741332E C4      | 0.9004844E C3  | 0.1986667E 04 | 23.830   | 3.205   | 0.019326 | 9  | 36.735    |  |
| 0.6143942E C3      | 0.5066543E C3  | 0.1050576E 04 | 55.935   | 5.543   | 0.010454 | 10 | 40.816    |  |

BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 472 CTR 413 FLT 609.0 TR 50  
OVERALL CYCLIC LOAD = 0.1161305 C5

| ZERO POSITION USED | 1.22           | LOAD/IN USED  | 41340.00 |         |          |    |           |  |
|--------------------|----------------|---------------|----------|---------|----------|----|-----------|--|
| AJ                 | EJ             | CJ            | PHIJC    | PSIJC   | CJ/CJMAX | J  | FREQUENCY |  |
| 0.1734051E C4      |                |               |          |         |          |    |           |  |
| -0.3363602E C4     | -0.3318447E C4 | 0.5432473F 04 | 315.333  | 315.333 | 0.718304 | 1  | 4.082     |  |
| -0.3397742E C4     | 0.0071613F C4  | 0.7584035E 04 | 117.179  | 59.590  | 1.000000 | 2  | 8.163     |  |
| 0.2143955E C4      | 0.1613135E C4  | 0.2683050E 04 | 36.958   | 12.319  | 0.333776 | 3  | 12.245    |  |
| 0.7940776E C2      | -0.1064442E C4 | 0.1067354E 04 | 276.266  | 68.567  | 0.140743 | 4  | 16.327    |  |
| 0.1332326E C3      | 0.2465406E C3  | 0.2309465F 03 | 62.334   | 12.477  | 0.037045 | 5  | 20.408    |  |
| 0.3949415E C3      | -0.6685107E C3 | 0.6685107E 03 | 270.034  | 45.006  | 0.008147 | 6  | 24.490    |  |
| 0.2879615E C3      | 0.2870007F C3  | 0.4065747E 03 | 44.902   | 6.415   | 0.053609 | 7  | 28.571    |  |
| -0.4960949E C2     | 0.4305367E C3  | 0.4083354E 03 | 70.986   | 12.123  | 0.053650 | 8  | 32.653    |  |
| -0.2350072E C3     | -0.3003867E C2 | 0.2958713E 03 | 137.606  | 21.067  | 0.035540 | 9  | 36.735    |  |
| -0.3737219E C3     | -0.3240591E C3 | 0.4464421E 03 | 220.552  | 22.055  | 0.065723 | 10 | 40.816    |  |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 472 CTR 413 FLT 609.0 TR 47  
OVERALL CYCLIC LOAD = 0.374422F C5

| ZERO POSITION USED | 1.42           | LOAD/IN USED  | -127699.94 |         |          |    |           |  |
|--------------------|----------------|---------------|------------|---------|----------|----|-----------|--|
| AJ                 | EJ             | CJ            | PHIJC      | PSIJC   | CJ/CJMAX | J  | FREQUENCY |  |
| 0.2034859E C5      |                |               |            |         |          |    |           |  |
| -0.1030332E C5     | 0.1673033E C5  | 0.1984647E C5 | 121.627    | 121.627 | 1.000000 | 1  | 4.082     |  |
| 0.5505051E C4      | -0.1116084E C5 | 0.1244468E C5 | 296.255    | 148.127 | 0.633366 | 2  | 8.163     |  |
| -0.3184757E C4     | -0.2429760E C4 | 0.4005797E C4 | 217.341    | 72.447  | 0.203873 | 3  | 12.245    |  |
| 0.1605801E C4      | -0.7142144E C3 | 0.2016522E C4 | 339.256    | 94.814  | 0.102630 | 4  | 16.327    |  |
| -0.1542002E C4     | 0.5466531E C2  | 0.1226424E C4 | 145.179    | 29.636  | 0.062418 | 5  | 20.408    |  |
| -0.3585430E C2     | 0.9535173E C3  | 0.9541512E C3 | 92.154     | 15.359  | 0.048563 | 6  | 24.490    |  |
| 0.3343586E C3      | -0.2053770E C3 | 0.3923964E C3 | 328.439    | 46.920  | 0.019971 | 7  | 28.571    |  |
| 0.4709443E C3      | -0.1104223E C4 | 0.1200457E C4 | 293.093    | 36.637  | 0.061097 | 8  | 32.653    |  |
| -0.3059690E C3     | -0.4641556E C3 | 0.5559296E C3 | 236.607    | 26.290  | 0.028294 | 9  | 36.735    |  |
| 0.2112175E C3      | 0.5022181E C3  | 0.5449195E C3 | 67.194     | 6.719   | 0.027733 | 10 | 40.816    |  |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 472 CTR 413 FLT 609.0 TR 44  
OVERALL CYCLIC LOAD = 0.725450E C4

| ZERO POSITION USED | 2.12           | LOAD/IN USED  | -12470.00 |        |          |    |           |  |
|--------------------|----------------|---------------|-----------|--------|----------|----|-----------|--|
| AJ                 | EJ             | CJ            | PHIJC     | PSIJC  | CJ/CJMAX | J  | FREQUENCY |  |
| -0.1649049E C2     |                |               |           |        |          |    |           |  |
| 0.2365214E C4      | 0.1614568E C4  | 0.2863755E C4 | 34.319    | 34.319 | 0.970762 | 1  | 4.082     |  |
| -0.2552184E C4     | 0.1479530E C4  | 0.2550004E C4 | 149.898   | 74.949 | 1.000000 | 2  | 8.163     |  |
| -0.7192910E C1     | 0.1440527E C3  | 0.1442522E C3 | 92.659    | 30.953 | 0.048892 | 3  | 12.245    |  |
| -0.4411733E C3     | -0.3794678E C3 | 0.5819326E C3 | 220.701   | 55.175 | 0.197265 | 4  | 16.327    |  |
| 0.1189975E C4      | 0.3621567E C3  | 0.1240037E C4 | 16.961    | 3.396  | 0.420250 | 5  | 20.408    |  |
| 0.1109246E C4      | -0.2856787E C3 | 0.1176268E C4 | 340.653   | 56.776 | 0.348734 | 6  | 24.490    |  |
| 0.2441370E C3      | 0.4069162E C2  | 0.2710196E C3 | 12.440    | 1.849  | 0.041871 | 7  | 28.571    |  |
| 0.1526947E C3      | 0.7130330E C3  | 0.7291947E C3 | 77.913    | 9.739  | 0.247186 | 8  | 32.653    |  |
| -0.3747061E C3     | -0.1400805E C3 | 0.4000339E C3 | 260.498   | 22.278 | 0.135604 | 9  | 36.735    |  |
| -0.4479280E C2     | -0.2013696E C3 | 0.2074344E C3 | 254.111   | 25.611 | 0.070317 | 10 | 40.816    |  |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 14 V= 199 KTS n= 1.61 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 454 FLT 609.0 TR 31

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.6146025E-01  | -0.1499351E-01 | 0.3194265E-01 | 332.076 | 312.006 | 1.000100 | 1  | 4.098     |
| 0.2020534E-01  | -0.1337254E-01 | 0.2897825E-01 | 219.347 | 109.673 | 0.093719 | 2  | 8.197     |
| -0.2240955E-01 | 0.6393713E-01  | 0.6446162E-01 | 97.363  | 32.454  | 0.020182 | 3  | 12.295    |
| -0.5261625E-02 | -0.5612331E-01 | 0.5645597E-01 | 276.223 | 67.056  | 0.017674 | 4  | 16.393    |
| 0.6119723E-02  | 0.4324715E-02  | 0.2094055E-01 | 142.445 | 32.439  | 0.006508 | 5  | 20.492    |
| -0.2030072E-01 | 0.2011369E-01  | 0.3375344E-01 | 143.423 | 23.934  | 0.010567 | 6  | 24.590    |
| -0.2710559E-01 | 0.2416418E-01  | 0.3663025E-01 | 125.741 | 17.677  | 0.012104 | 7  | 28.689    |
| -0.2143443E-01 | 0.2594155E-01  | 0.2724525E-01 | 137.737 | 13.475  | 0.008529 | 8  | 32.787    |
| -0.8327175E-02 | 0.1315519E-01  | 0.1412288E-01 | 111.335 | 12.370  | 0.004421 | 9  | 36.885    |
| -0.5137705E-02 | 0.5575444E-02  | 0.6286159E-02 | 71.910  | 7.171   | 0.001508 | 10 | 40.984    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 454 FLT 609.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.7731335E-04 | 0.1277533E-06  | 0.2164366E-05 | 143.925 | 143.925 | 1.000000 | 1  | 4.098     |
| -0.1747105E-06 | -0.2740990E-06 | 0.2455477E-06 | 275.212 | 147.006 | 0.011393 | 2  | 8.197     |
| 0.1550354E-06  | 0.4550078E-06  | 0.1213178E-05 | 156.229 | 52.076  | 0.050552 | 3  | 12.295    |
| -0.1110255E-05 | 0.6813746E-03  | 0.1123687E-03 | 77.328  | 9.332   | 0.005172 | 4  | 16.393    |
| 0.9935294E-03  | 0.6060943E-03  | 0.6175957E-04 | 7.505   | 1.501   | 0.028535 | 5  | 20.492    |
| 0.5123047E-04  | -0.8771831E-03 | 0.1469235E-04 | 216.656 | 30.110  | 0.006788 | 6  | 24.590    |
| -0.1778645E-06 | -0.1680094E-06 | 0.3375273E-06 | 330.030 | 47.147  | 0.015595 | 7  | 28.689    |
| 0.2923564E-06  | -0.2152674E-06 | 0.2152632E-06 | 270.174 | 33.772  | 0.007946 | 8  | 32.787    |
| 0.6930381E-01  | 0.4707014E-02  | 0.1440129E-02 | 178.154 | 19.795  | 0.006339 | 9  | 36.885    |
| -0.1479261E-04 | 0.1210713E-04  | 0.1344534E-04 | 64.229  | 6.423   | 0.006212 | 10 | 40.984    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 454 FLT 609.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.3154784E-03 | -0.3943050E-02 | 0.1471554E-03 | 217.424 | 217.424 | 0.272970 | 1  | 4.098     |
| -0.1168676E-03 | -0.4366641E-03 | 0.5351040E-03 | 339.554 | 154.777 | 1.000000 | 2  | 8.197     |
| 0.3433025E-03  | 0.4643419E-02  | 0.7010773E-02 | 143.683 | 49.563  | 0.130045 | 3  | 12.295    |
| -0.3396575E-02 | -0.1254018E-03 | 0.1309403E-03 | 261.226 | 69.306  | 0.242685 | 4  | 16.393    |
| -0.1997389E-02 | 0.1116975E-02  | 0.3030672E-02 | 172.019 | 34.404  | 0.140563 | 5  | 20.492    |
| -0.7537857E-01 | 0.1677015E-03  | 0.1071466E-03 | 75.196  | 15.666  | 0.110730 | 6  | 24.590    |
| -0.3049066E-02 | 0.2540173E-02  | 0.4001133E-02 | 137.690 | 14.551  | 0.074219 | 7  | 28.689    |
| -0.7776256E-01 | 0.0416551E-01  | 0.1140038E-02 | 132.743 | 16.553  | 0.021258 | 8  | 32.787    |
| 0.1825760E-02  | -0.3351118E-02 | 0.3816050E-02 | 298.543 | 33.172  | 0.070766 | 9  | 36.885    |
| -0.6675903E-01 | 0.9331511E-01  | 0.1147662E-02 | 125.570 | 12.557  | 0.021268 | 10 | 40.984    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 472 CTR 454 FLT 609.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2901220E-05 | 0.3572011E-05  | 0.5216175E-05 | 136.761 | 136.761 | 1.000000 | 1  | 4.098     |
| -0.3301215E-05 | -0.2550633E-05 | 0.3160141E-05 | 271.619 | 145.805 | 0.605669 | 2  | 8.197     |
| 0.1171164E-05  | 0.2246050E-04  | 0.2246081E-04 | 91.351  | 30.450  | 0.043371 | 3  | 12.295    |
| -0.5276557E-02 | -0.2216121E-04 | 0.5125734E-04 | 205.595 | 51.339  | 0.058343 | 4  | 16.393    |
| -0.4656336E-04 | -0.8727275E-03 | 0.2164850E-04 | 336.473 | 67.254  | 0.041657 | 5  | 20.492    |
| 0.2003219E-04  | 0.2176422E-03  | 0.2383353E-04 | 5.170   | 0.653   | 0.045642 | 6  | 24.590    |
| 0.2373844E-04  | 0.1364423E-04  | 0.1654524E-04 | 55.501  | 7.666   | 0.012494 | 7  | 28.689    |
| 0.9736795E-03  | 0.7615673E-03  | 0.7371509E-03 | 75.65   | 9.133   | 0.015071 | 8  | 32.787    |
| -0.3356973E-03 | -0.3629333E-02 | 0.3060044E-03 | 187.190 | 26.753  | 0.005906 | 9  | 36.885    |
| -0.2472354E-01 | -0.2046181E-01 | 0.2096335E-03 | 269.324 | 26.432  | 0.004014 | 10 | 40.984    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 14 V= 199 KTS n= 1.61 g

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AH-50A SHIP 1009 T 472 CTR 454 FLT 609.0 TR 3

| AJ            | BJ            | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|---------------|---------------|---------------|---------|---------|----------|----|-----------|
| 0.419505E 05  |               |               |         |         |          |    |           |
| -0.015523E 04 | 0.100045E 04  | 0.1008355E 06 | 93.505  | 93.505  | 1.000000 | 1  | 4.098     |
| -0.564210E 04 | -0.405505E 04 | 0.755534E 04  | 210.076 | 105.538 | 0.078834 | 2  | 8.197     |
| -0.352234E 04 | -0.634844E 04 | 0.835934E 04  | 239.785 | 77.928  | 0.069413 | 3  | 12.295    |
| -0.142002E 04 | -0.059824E 03 | 0.191852E 04  | 235.973 | 51.495  | 0.015754 | 4  | 16.393    |
| 0.973405E 03  | 0.159385E 03  | 0.586431E 03  | 9.219   | 1.863   | 0.009783 | 5  | 20.492    |
| 0.017055E 03  | -0.247230E 03 | 0.604763E 03  | 338.161 | 56.360  | 0.000513 | 6  | 24.590    |
| -0.257016E 03 | -0.575785E 03 | 0.630755E 03  | 245.896 | 35.128  | 0.000256 | 7  | 28.689    |
| 0.906431E 01  | -0.101812E 02 | 0.102251E 03  | 275.545 | 34.443  | 0.001014 | 8  | 32.787    |
| 0.033815E 02  | 0.294747E 03  | 0.302506E 03  | 76.994  | 8.535   | 0.003030 | 9  | 36.885    |
| -0.400200E 02 | 0.155794E 03  | 0.218335E 03  | 116.267 | 11.627  | 0.002165 | 10 | 40.984    |

BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AH-50A SHIP 1009 T 472 CTR 454 FLT 609.0 TR 50

| AJ            | BJ            | CJ           | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|---------------|---------------|--------------|---------|---------|----------|----|-----------|
| 0.101921E 04  |               |              |         |         |          |    |           |
| 0.426078E 04  |               |              |         |         |          |    |           |
| -0.105104E 04 | 0.745852E 04  | 0.642115E 04 | 311.043 | 311.643 | 0.835359 | 1  | 4.098     |
| 0.203767E 04  | 0.745852E 04  | 0.708605E 04 | 104.747 | 52.121  | 1.000000 | 2  | 8.197     |
| -0.125512E 03 | 0.945034E 03  | 0.229181E 04 | 24.325  | 8.118   | 0.298127 | 3  | 12.295    |
| -0.400194E 02 | -0.631913E 03 | 0.644257E 03 | 233.706 | 64.091  | 0.003315 | 4  | 16.393    |
| 0.221777E 03  | -0.155505E 03 | 0.182331E 03 | 253.233 | 50.651  | 0.021138 | 5  | 20.492    |
| 0.914733E 02  | -0.720343E 02 | 0.233127E 03 | 341.057 | 50.576  | 0.030355 | 6  | 24.590    |
| 0.234752E 03  | 0.170384E 02  | 0.931805E 02 | 11.035  | 1.576   | 0.012124 | 7  | 28.689    |
| -0.090411E 03 | 0.031072E 03  | 0.511805E 03 | 75.031  | 9.385   | 0.110622 | 8  | 32.787    |
| -0.004011E 03 | 0.208415E 03  | 0.720219E 03 | 163.339 | 13.149  | 0.054570 | 9  | 36.885    |
| -0.007021E 03 | -0.135175E 03 | 0.074067E 03 | 176.734 | 17.028  | 0.007773 | 10 | 40.984    |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AH-50A SHIP 1009 T 472 CTR 454 FLT 609.0 TR 42

| AJ            | BJ            | CJ           | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|---------------|---------------|--------------|---------|---------|----------|----|-----------|
| 0.238184E 05  |               |              |         |         |          |    |           |
| -0.517944E 04 | 0.243623E 05  | 0.249061E 05 | 102.004 | 102.004 | 1.000000 | 1  | 4.098     |
| -0.304073E 03 | -0.818301E 03 | 0.895437E 03 | 246.015 | 123.008 | 0.035959 | 2  | 8.197     |
| -0.127331E 04 | -0.206905E 04 | 0.242947E 04 | 238.591 | 79.464  | 0.097542 | 3  | 12.295    |
| 0.324634E 04  | -0.440660E 03 | 0.327612E 04 | 352.270 | 88.067  | 0.131535 | 4  | 16.393    |
| -0.071710E 03 | -0.624220E 03 | 0.127743E 04 | 220.476 | 44.095  | 0.051281 | 5  | 20.492    |
| -0.328625E 03 | -0.754500E 03 | 0.827548E 03 | 246.802 | 41.100  | 0.033226 | 6  | 24.590    |
| 0.447270E 03  | 0.236094E 01  | 0.457333E 03 | 0.296   | 0.042   | 0.018358 | 7  | 28.689    |
| 0.937061E 03  | 0.100289E 04  | 0.137254E 04 | 46.943  | 5.568   | 0.055107 | 8  | 32.787    |
| -0.119627E 04 | -0.509146E 03 | 0.132647E 04 | 205.655 | 22.794  | 0.052016 | 9  | 36.885    |
| 0.178522E 02  | -0.130600E 03 | 0.132012E 03 | 277.772 | 27.777  | 0.005300 | 10 | 40.984    |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AH-50A SHIP 1009 T 472 CTR 454 FLT 609.0 TR 44

| AJ            | BJ            | CJ           | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|---------------|---------------|--------------|---------|--------|----------|----|-----------|
| 0.405291E 03  |               |              |         |        |          |    |           |
| 0.239971E 04  | 0.215306E 04  | 0.322327E 04 | 41.911  | 41.911 | 1.000000 | 1  | 4.098     |
| -0.255214E 04 | 0.177098E 04  | 0.311577E 04 | 145.226 | 72.613 | 0.966587 | 2  | 8.197     |
| 0.253255E 04  | -0.403970E 03 | 0.404664E 03 | 273.590 | 91.197 | 0.125544 | 3  | 12.295    |
| -0.660723E 03 | -0.267763E 03 | 0.621376E 03 | 205.526 | 51.301 | 0.192773 | 4  | 16.393    |
| 0.117209E 04  | -0.103187E 03 | 0.117623E 04 | 354.969 | 70.994 | 0.365030 | 5  | 20.492    |
| 0.117047E 04  | -0.671021E 03 | 0.134014E 04 | 330.174 | 55.079 | 0.418562 | 6  | 24.590    |
| 0.402533E 03  | 0.204417E 03  | 0.451464E 03 | 26.923  | 3.846  | 0.140064 | 7  | 28.689    |
| 0.186493E 03  | 0.756014E 03  | 0.778601E 03 | 76.143  | 9.518  | 0.241581 | 8  | 32.787    |
| -0.260272E 03 | -0.119781E 02 | 0.260647E 03 | 183.074 | 20.342 | 0.080864 | 9  | 36.885    |
| -0.040971E 02 | -0.728171E 01 | 0.044110E 02 | 184.949 | 18.445 | 0.076188 | 10 | 40.984    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 15 V= 119.5 KTS n= .96 g

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## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 469 CTR 755 FLT 604.0 TR 31

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.00000000 C1  |                |               |         |         |          |    |           |
| 0.00000000 C1  | -0.35557215 J1 | 0.51755385 J1 | 216.863 | 216.863 | 1.000000 | 1  | 4.115     |
| -0.00000000 C1 | -0.10000000 J2 | 0.10000000 J2 | 275.547 | 116.298 | 0.000000 | 2  | 8.230     |
| -0.00000000 C1 | -0.54644505 C1 | 0.76019255 C1 | 225.248 | 75.116  | 0.014847 | 3  | 12.346    |
| 0.00000000 C1  | -0.30276005 J1 | 0.51800435 J1 | 215.652 | 78.713  | 0.013322 | 4  | 16.461    |
| -0.00000000 C1 | -0.04000000 J2 | 0.10000000 J2 | 210.310 | 42.076  | 0.003211 | 5  | 20.576    |
| -0.00000000 C1 | -0.15000000 J2 | 0.21646765 C1 | 133.218 | 22.210  | 0.004183 | 6  | 24.691    |
| 0.00000000 C1  | -0.10000000 J2 | 0.10000000 J2 | 42.427  | 6.161   | 0.000000 | 7  | 28.807    |
| -0.00000000 C1 | -0.04000000 J2 | 0.04000000 J2 | 25.515  | 31.690  | 0.001914 | 8  | 32.922    |
| -0.00000000 C1 | 0.00000000 J2  | 0.00000000 J2 | 10.344  | 10.344  | 0.001452 | 9  | 37.037    |
| -0.00000000 C1 | 0.00000000 J2  | 0.00000000 J2 | 15.754  | 15.754  | 0.001326 | 10 | 41.152    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 469 CTR 755 FLT 604.0 TR 36

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.00000000 C4 |                |               |         |         |          |    |           |
| 0.00000000 C4  | 0.51211537 C4  | 0.51211537 C4 | 73.590  | 73.590  | 1.000000 | 1  | 4.115     |
| -0.00000000 C4 | -0.93000000 J3 | 0.10000000 J3 | 211.355 | 105.678 | 0.033795 | 2  | 8.230     |
| -0.00000000 C4 | -0.24720115 C5 | 0.24720115 C5 | 265.096 | 88.365  | 0.046793 | 3  | 12.346    |
| -0.00000000 C4 | 0.24000000 J3  | 0.10000000 J3 | 163.579 | 40.895  | 0.019776 | 4  | 16.461    |
| -0.00000000 C4 | 0.71220000 C4  | 0.71220000 C4 | 91.048  | 18.209  | 0.133416 | 5  | 20.576    |
| 0.00000000 C4  | -0.37000000 J3 | 0.10000000 J3 | 281.577 | 46.730  | 0.016316 | 6  | 24.691    |
| -0.00000000 C4 | -0.14000000 J3 | 0.10000000 J3 | 244.220 | 34.889  | 0.010914 | 7  | 28.807    |
| -0.00000000 C4 | 0.54774465 C4  | 0.70100000 J3 | 128.071 | 16.384  | 0.013141 | 8  | 32.922    |
| 0.00000000 C4  | 0.22000000 J3  | 0.22000000 J3 | 70.129  | 7.792   | 0.045330 | 9  | 37.037    |
| 0.57300000 C4  | 0.22000000 J3  | 0.00000000 J3 | 21.345  | 2.134   | 0.011537 | 10 | 41.152    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 469 CTR 755 FLT 604.0 TR 11

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.00000000 C1  |                |               |         |         |          |    |           |
| -0.00000000 C1 | -0.31327930 C2 | 0.19554255 C3 | 185.219 | 185.219 | 0.092282 | 1  | 4.115     |
| 0.00000000 C1  | -0.76300000 J2 | 0.10000000 J2 | 275.547 | 142.812 | 0.037161 | 2  | 8.230     |
| -0.00000000 C1 | -0.21000000 C1 | 0.21000000 C1 | 275.547 | 50.698  | 0.000000 | 3  | 12.346    |
| -0.00000000 C1 | -0.57327240 C2 | 0.57327240 C2 | 265.096 | 67.263  | 0.261229 | 4  | 16.461    |
| -0.00000000 C1 | -0.20000000 J2 | 0.10000000 J2 | 251.761 | 50.752  | 0.010761 | 5  | 20.576    |
| -0.00000000 C1 | -0.08456625 C1 | 0.18590450 C2 | 188.617 | 31.436  | 0.086666 | 6  | 24.691    |
| 0.00000000 C1  | 0.70327240 C2  | 0.15780000 C2 | 21.447  | 3.778   | 0.072050 | 7  | 28.807    |
| -0.00000000 C1 | 0.11500000 J2  | 0.10000000 J2 | 140.319 | 17.540  | 0.085684 | 8  | 32.922    |
| -0.00000000 C1 | -0.15522555 C2 | 0.23104575 C2 | 216.267 | 24.030  | 0.151068 | 9  | 37.037    |
| -0.00000000 C1 | -0.77800000 C1 | 0.21000000 C2 | 200.758 | 20.076  | 0.100275 | 10 | 41.152    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 469 CTR 755 FLT 604.0 TR 1

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.00000000 C4 |                |               |         |         |          |    |           |
| 0.00000000 C4  | 0.54400145 C4  | 0.11075415 C4 | 58.774  | 58.774  | 1.000000 | 1  | 4.115     |
| -0.00000000 C4 | -0.40000000 J4 | 0.10000000 J4 | 282.514 | 141.257 | 0.371161 | 2  | 8.230     |
| -0.00000000 C4 | -0.40000000 J4 | 0.40000000 C4 | 261.254 | 89.431  | 0.416180 | 3  | 12.346    |
| -0.00000000 C4 | -0.44000000 C4 | 0.77500000 C4 | 214.818 | 53.655  | 0.070706 | 4  | 16.461    |
| 0.00000000 C4  | -0.30000000 J4 | 0.30000000 C4 | 284.768 | 50.914  | 0.036125 | 5  | 20.576    |
| -0.00000000 C4 | -0.30000000 J4 | 0.40000000 C4 | 225.415 | 38.237  | 0.046600 | 6  | 24.691    |
| -0.00000000 C4 | 0.32000000 J4  | 0.37752575 C4 | 115.560 | 17.080  | 0.036159 | 7  | 28.807    |
| 0.00000000 C4  | 0.40000000 J4  | 0.77500000 C4 | 21.437  | 4.205   | 0.070706 | 8  | 32.922    |
| 0.00000000 C4  | 0.15500000 J4  | 0.20000000 C4 | 84.505  | 5.380   | 0.014189 | 9  | 37.037    |
| 0.00000000 C4  | 0.20000000 J4  | 0.20000000 C4 | 70.750  | 7.025   | 0.025150 | 10 | 41.152    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 15 V= 119.5 KTS n= .96 g

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 755 FLT 604.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.7413139E 05  |                |               |         |        |          | 1  | 4.115     |
| 0.5401805E 04  | 0.8137225E 04  | 0.8505800E 04 | 72.565  | 72.765 | 1.000000 | 2  | 8.230     |
| 0.5240827E 04  | 0.7844813E 04  | 0.8559492E 04 | 56.754  | 28.371 | 0.112180 | 3  | 12.346    |
| 0.7170156E 04  | -0.1075505E 04 | 0.1081000E 04 | 273.805 | 51.270 | 0.127194 | 4  | 16.461    |
| -0.1501273E 04 | -0.8254493E 02 | 0.1501438E 04 | 182.713 | 45.678 | 0.073084 | 5  | 20.576    |
| -0.1470503E 04 | -0.1171240E 02 | 0.1480553E 04 | 183.453 | 36.391 | 0.061543 | 6  | 24.691    |
| -0.2140333E 03 | -0.6333735E 03 | 0.6720552E 03 | 250.456 | 41.743 | 0.007902 | 7  | 28.807    |
| -0.0632260E 03 | 0.2112611E 03  | 0.2576501E 03 | 145.043 | 23.578 | 0.010553 | 8  | 32.922    |
| 0.1132440E 04  | 0.5864572E 03  | 0.1276303E 04 | 27.367  | 14.21  | 0.015332 | 9  | 37.037    |
| 0.2802765E 03  | -0.5615844E 03 | 0.1244735E 04 | 305.768 | 34.374 | 0.014629 | 10 | 41.152    |
| -0.1260335E 03 | -0.4137845E 03 | 0.5257720E 03 | 231.036 | 23.184 | 0.006181 |    |           |

LADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 755 FLT 604.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2367895E 04  |                |               |         |         |          | 1  | 4.115     |
| 0.3167825E 04  | -0.3014140E 04 | 0.4700543E 04 | 320.192 | 323.192 | 1.333333 | 2  | 8.230     |
| -0.1275413E 04 | 0.5282075E 03  | 0.3125115E 04 | 170.082 | 85.041  | 0.663572 | 3  | 12.346    |
| 0.5407770E 03  | 0.1405690E 04  | 0.1588400E 04 | 65.750  | 23.263  | 0.337352 | 4  | 16.461    |
| -0.2174671E 03 | -0.1022639E 03 | 0.2902710E 03 | 221.480 | 55.373  | 0.361635 | 5  | 20.576    |
| -0.1132744E 03 | 0.1437846E 03  | 0.1000400E 03 | 127.891 | 25.570  | 0.000729 | 6  | 24.691    |
| -0.2505268E 03 | -0.4825555E 03 | 0.6245800E 03 | 230.590 | 38.431  | 0.132620 | 7  | 28.807    |
| 0.1474743E 03  | -0.7082872E 02 | 0.1872306E 03 | 330.725 | 47.247  | 0.034608 | 8  | 32.922    |
| 0.2514025E 02  | 0.8717875E 03  | 0.8772760E 03 | 88.151  | 11.019  | 0.185206 | 9  | 37.037    |
| 0.5401805E 04  | 0.3652257E 03  | 0.3652215E 03 | 81.925  | 9.058   | 0.078407 | 10 | 41.152    |
| -0.4526670E 01 | -0.3532114E 01 | 0.5539331E 01 | 219.421 | 21.962  | 0.001176 |    |           |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 755 FLT 604.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.3061441E 05  |                |               |         |        |          | 1  | 4.115     |
| 0.3403442E 04  | 0.2027263E 05  | 0.2055636E 05 | 80.469  | 80.469 | 1.000000 | 2  | 8.230     |
| 0.1425454E 04  | 0.3137358E 04  | 0.3444003E 04 | 65.547  | 32.783 | 0.167637 | 3  | 12.346    |
| 0.8571067E 03  | -0.5046727E 04 | 0.5168305E 04 | 279.547 | 93.182 | 0.251421 | 4  | 16.461    |
| 0.8104971E 02  | 0.1134636E 04  | 0.1394382E 04 | 54.461  | 13.615 | 0.067832 | 5  | 20.576    |
| -0.9512376E 02 | -0.7025211E 02 | 0.9637495E 03 | 184.003 | 36.819 | 0.047856 | 6  | 24.691    |
| -0.3246478E 03 | 0.6480129E 03  | 0.7757019E 03 | 116.754 | 19.455 | 0.025303 | 7  | 28.807    |
| 0.2465630E 03  | 0.5752148E 03  | 0.667415E 03  | 66.605  | 9.515  | 0.030489 | 8  | 32.922    |
| 0.5327820E 02  | -0.6668913E 03 | 0.6685171E 03 | 273.517 | 34.190 | 0.042251 | 9  | 37.037    |
| 0.5715364E 02  | -0.7791145E 02 | 0.5769278E 03 | 352.237 | 34.137 | 0.028061 | 10 | 41.152    |
| 0.3250765E 03  | -0.6207671E 02 | 0.3317263E 03 | 349.215 | 34.921 | 0.016139 |    |           |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 755 FLT 604.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.4482385E 03 |                |               |         |        |          | 1  | 4.115     |
| 0.1714444E 04  | 0.1494010E 04  | 0.2274143E 04 | 41.068  | 41.068 | 1.000000 | 2  | 8.230     |
| -0.1124946E 04 | 0.3819849E 03  | 0.1190335E 04 | 160.928 | 30.463 | 0.523421 | 3  | 12.346    |
| -0.3444270E 03 | 0.4242296E 03  | 0.5625293E 03 | 124.055 | 43.018 | 0.247359 | 4  | 16.461    |
| -0.3792000E 03 | -0.3153419E 02 | 0.3805080E 03 | 164.754 | 46.188 | 0.167320 | 5  | 20.576    |
| -0.6077737E 03 | 0.4064104E 03  | 0.7311348E 03 | 146.230 | 29.246 | 0.221499 | 6  | 24.691    |
| -0.1319646E 02 | -0.3086240E 03 | 0.3089000E 03 | 267.551 | 44.892 | 0.135834 | 7  | 28.807    |
| -0.7850635E 02 | -0.3845442E 03 | 0.3944358E 03 | 258.519 | 36.931 | 0.173444 | 8  | 32.922    |
| -0.1277127E 03 | 0.7020264E 03  | 0.7135486E 03 | 160.311 | 12.539 | 0.313766 | 9  | 37.037    |
| -0.1290030E 03 | 0.1342046E 02  | 0.1297922E 03 | 174.037 | 19.337 | 0.057074 | 10 | 41.152    |
| -0.4645941E 02 | 0.1019762E 03  | 0.1120626E 03 | 114.493 | 11.449 | 0.049277 |    |           |



# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 16 V= 120.5 KTS n= .93 g**

## **BLADE FEATHER ANGLE**

HARMONIC ANALYSIS MODEL AH-56A SHIP 1005 T 469 CTR 925 FLT 604.0 TR 31

| 1J             | 4J             | CJ            | PH1JC   | PS1JC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| 0.97443261 C1  |                |               |         |         |           |    |           |
| 0.75637256 C1  | -0.31176655 C1 | 0.50437722 C1 | 371.805 | 321.805 | 1.0000000 | 1  | 4.115     |
| -0.59152377 C1 | -0.13612315 C1 | 0.14313822 C1 | 224.225 | 114.612 | 0.0777786 | 2  | 8.230     |
| -0.43067755 C2 | -0.56762215 C1 | 0.07171041 C1 | 764.860 | 89.287  | 0.014267  | 3  | 12.346    |
| 0.32765467 C1  | -0.25671497 C1 | 0.41263135 C1 | 271.492 | 80.373  | 0.008121  | 4  | 16.461    |
| -0.15863257 C2 | 0.18415737 C2  | 0.27451751 C2 | 116.443 | 27.289  | 0.000544  | 5  | 20.576    |
| -0.07314747 C1 | -0.25954755 C2 | 0.11031207 C1 | 193.610 | 27.268  | 0.007127  | 6  | 24.691    |
| 0.27697716 C2  | -0.28544007 C2 | 0.82505066 C2 | 288.666 | 41.238  | 0.001644  | 7  | 28.807    |
| -0.27396447 C2 | 0.16153775 C1  | 0.17677497 C1 | 117.666 | 14.738  | 0.003505  | 8  | 32.922    |
| -0.27577117 C2 | -0.80046797 C2 | 0.60571107 C2 | 262.436 | 25.160  | 0.001201  | 9  | 37.037    |
| 0.10256047 C1  | -0.37220607 C2 | 0.44405557 C2 | 275.532 | 27.553  | 0.000767  | 10 | 41.152    |

## **SHAFT MOMENT**

HARMONIC ANALYSIS MODEL AH-56A SHIP 1005 T 469 CTR 925 FLT 604.0 TR 36

| 1J             | 4J             | CJ            | PH1JC   | PS1JC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| -0.62157815 C4 |                |               |         |         |           |    |           |
| 0.21600525 C4  | 0.47050025 C5  | 0.47153322 C5 | 86.376  | 86.376  | 1.0000000 | 1  | 4.115     |
| -0.13240457 C4 | -0.89214267 C5 | 0.15737565 C5 | 212.734 | 106.392 | 0.033377  | 2  | 8.230     |
| 0.59407475 C4  | -0.21431295 C5 | 0.22293105 C5 | 285.593 | 95.198  | 0.471893  | 3  | 12.346    |
| -0.44308457 C5 | -0.29765335 C5 | 0.27144325 C5 | 211.250 | 52.513  | 0.012177  | 4  | 16.461    |
| -0.27152175 C4 | 0.46733105 C4  | 0.76792215 C5 | 120.885 | 24.177  | 0.120448  | 5  | 20.576    |
| -0.53607705 C5 | -0.11669127 C4 | 0.14476575 C5 | 233.713 | 38.952  | 0.030703  | 6  | 24.691    |
| 0.44338711 C5  | 0.20036635 C4  | 0.21335945 C5 | 281.874 | 40.268  | 0.044720  | 7  | 28.807    |
| -0.26396457 C5 | -0.21009175 C5 | 0.32245535 C5 | 220.836 | 27.604  | 0.008839  | 8  | 32.922    |
| -0.21271615 C4 | 0.74615635 C5  | 0.22254295 C5 | 180.670 | 17.452  | 0.047609  | 9  | 37.037    |
| 0.31440722 C5  | 0.72175125 C5  | 0.78725105 C5 | 66.461  | 6.460   | 0.016697  | 10 | 41.152    |

## **PITCH LINK TENSION**

HARMONIC ANALYSIS MODEL AH-56A SHIP 1005 T 469 CTR 925 FLT 604.0 TR 11

| 1J             | 4J             | CJ            | PH1JC   | PS1JC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| 0.14405901 C1  |                |               |         |         |           |    |           |
| -0.14830747 C1 | -0.22554095 C2 | 0.16587095 C1 | 187.780 | 187.780 | 0.744747  | 1  | 4.115     |
| 0.13256565 C1  | -0.83326355 C2 | 0.16154255 C1 | 324.854 | 163.427 | 0.739233  | 2  | 8.230     |
| 0.32416865 C2  | -0.22557695 C1 | 0.22809215 C1 | 270.170 | 62.723  | 1.0000000 | 3  | 12.346    |
| -0.16107061 C1 | -0.37557315 C2 | 0.79817465 C2 | 288.641 | 67.210  | 0.349041  | 4  | 16.461    |
| -0.37103005 C2 | -0.72004567 C2 | 0.26507255 C2 | 270.444 | 47.290  | 0.170264  | 5  | 20.576    |
| -0.37222555 C2 | 0.14778675 C2  | 0.41517095 C2 | 153.105 | 25.518  | 0.192001  | 6  | 24.691    |
| 0.16652775 C2  | 0.37677325 C2  | 0.34322345 C2 | 71.518  | 10.274  | 0.150476  | 7  | 28.807    |
| -0.07061727 C1 | 0.51489355 C1  | 0.10422405 C2 | 180.394 | 18.799  | 0.345654  | 8  | 32.922    |
| -0.21572725 C2 | -0.28018675 C2 | 0.36077525 C2 | 233.379 | 25.070  | 0.159175  | 9  | 37.037    |
| -0.13355575 C2 | 0.95371315 C1  | 0.25026095 C2 | 150.744 | 15.024  | 0.097750  | 10 | 41.152    |

## **FIXED HUB FLAP AT STA 18**

HARMONIC ANALYSIS MODEL AH-56A SHIP 1005 T 469 CTR 925 FLT 604.0 TR 1

| 1J             | 4J             | CJ            | PH1JC   | PS1JC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| -0.15587405 C4 |                |               |         |         |           |    |           |
| 0.18776027 C4  | 0.91573975 C4  | 0.90447475 C4 | 64.942  | 64.942  | 1.0000000 | 1  | 4.115     |
| 0.11740227 C4  | -0.46139427 C4 | 0.41681841 C4 | 285.656 | 142.828 | 0.460940  | 2  | 8.230     |
| -0.10088135 C4 | -0.42756415 C4 | 0.46417305 C4 | 247.052 | 82.364  | 0.513157  | 3  | 12.346    |
| -0.51830645 C1 | -0.81475315 C1 | 0.15220375 C4 | 232.006 | 58.201  | 0.117087  | 4  | 16.461    |
| 0.77727275 C1  | -0.60516075 C1 | 0.77414655 C1 | 112.078 | 66.408  | 0.095541  | 5  | 20.576    |
| 0.10084875 C1  | -0.66736735 C1 | 0.63973215 C1 | 227.850 | 47.982  | 0.070575  | 6  | 24.691    |
| -0.20120745 C1 | 0.57071175 C2  | 0.25277157 C1 | 165.570 | 23.710  | 0.076282  | 7  | 28.807    |
| 0.10027275 C1  | 0.52376645 C1  | 0.65534945 C1 | 54.535  | 6.017   | 0.072456  | 8  | 32.922    |
| -0.20057545 C1 | 0.18053645 C1  | 0.10105765 C2 | 23.074  | 10.743  | 0.017807  | 9  | 37.037    |
| -0.27337645 C2 | 0.73126135 C2  | 0.13817395 C2 | 117.690 | 13.760  | 0.011518  | 10 | 41.152    |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 16 V= 120.5 KTS n= .93 g

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1005 T 469 CTR 925 FLT 604.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.00000000 05  |                |               |         |        |          | 1  | 4.115     |
| 0.27000000 05  | 0.74550000 05  | 0.81624000 05 | 70.611  | 70.611 | 1.000000 | 2  | 8.230     |
| 0.00000000 04  | 0.00000000 04  | 0.00000000 05 | 59.841  | 26.520 | 0.134019 | 3  | 12.346    |
| -0.00000000 03 | -0.00000000 05 | 0.00000000 05 | 266.818 | 68.939 | 0.135639 | 4  | 16.461    |
| -0.00000000 04 | 0.00000000 05  | 0.00000000 04 | 163.490 | 40.877 | 0.037688 | 5  | 20.576    |
| -0.00000000 04 | 0.00000000 04  | 0.00000000 04 | 117.601 | 22.521 | 0.017437 | 6  | 24.691    |
| 0.00000000 03  | 0.00000000 04  | 0.00000000 04 | 277.054 | 45.487 | 0.014816 | 7  | 28.807    |
| -0.00000000 03 | 0.00000000 03  | 0.00000000 03 | 192.141 | 21.734 | 0.010104 | 8  | 32.922    |
| 0.00000000 04  | 0.00000000 03  | 0.00000000 04 | 31.871  | 3.084  | 0.022720 | 9  | 37.037    |
| 0.00000000 03  | 0.00000000 03  | 0.00000000 04 | 327.083 | 33.564 | 0.012476 | 10 | 41.152    |
| -0.00000000 03 | -0.00000000 03 | 0.00000000 03 | 276.838 | 23.684 | 0.003583 |    |           |

BLADE FLAP AT STA 176

HARMONIC ANALYSIS MODEL AH-56A SHIP 1005 T 469 CTR 925 FLT 604.0 TR 30

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.25500000 04  |                |               |         |         |          | 1  | 4.115     |
| 0.00000000 04  | 0.00000000 04  | 0.00000000 04 | 317.808 | 317.808 | 1.000000 | 2  | 8.230     |
| -0.00000000 04 | 0.00000000 03  | 0.00000000 04 | 177.274 | 88.637  | 0.111187 | 3  | 12.346    |
| 0.00000000 03  | 0.00000000 04  | 0.00000000 04 | 81.534  | 27.178  | 0.061510 | 4  | 16.461    |
| -0.00000000 03 | -0.00000000 03 | 0.00000000 03 | 276.751 | 59.188  | 0.091721 | 5  | 20.576    |
| -0.00000000 03 | -0.00000000 03 | 0.00000000 03 | 204.363 | 40.877  | 0.037688 | 6  | 24.691    |
| -0.00000000 03 | 0.00000000 03  | 0.00000000 03 | 245.453 | 43.915  | 0.137183 | 7  | 28.807    |
| 0.00000000 03  | 0.00000000 03  | 0.00000000 03 | 245.457 | 42.708  | 0.077921 | 8  | 32.922    |
| 0.00000000 02  | 0.00000000 03  | 0.00000000 03 | 88.262  | 11.045  | 0.113648 | 9  | 37.037    |
| -0.00000000 03 | 0.00000000 03  | 0.00000000 03 | 117.126 | 13.314  | 0.061487 | 10 | 41.152    |
| 0.00000000 03  | 0.00000000 03  | 0.00000000 03 | 30.885  | 3.087   | 0.044312 |    |           |

BLADE CHORD AT STA 176

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 925 FLT 604.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.30194471 05  |                |               |         |        |          | 1  | 4.115     |
| 0.27540378 04  | 0.19702158 05  | 0.19844000 05 | 52.036  | 52.036 | 1.000000 | 2  | 8.230     |
| 0.10270000 04  | 0.25151938 04  | 0.29955555 04 | 57.102  | 28.551 | 0.150576 | 3  | 12.346    |
| 0.00000000 03  | 0.00000000 04  | 0.00000000 04 | 274.716 | 92.239 | 0.283187 | 4  | 16.461    |
| 0.00000000 03  | 0.00000000 04  | 0.00000000 04 | 61.408  | 15.252 | 0.083153 | 5  | 20.576    |
| -0.00000000 03 | -0.00000000 03 | 0.00000000 03 | 200.404 | 60.161 | 0.031737 | 6  | 24.691    |
| -0.00000000 03 | 0.00000000 03  | 0.00000000 03 | 90.537  | 15.090 | 0.074265 | 7  | 28.807    |
| 0.00000000 03  | 0.00000000 03  | 0.00000000 03 | 36.241  | 5.177  | 0.023360 | 8  | 32.922    |
| 0.00000000 03  | 0.00000000 03  | 0.00000000 03 | 302.951 | 37.869 | 0.039810 | 9  | 37.037    |
| 0.00000000 03  | 0.00000000 03  | 0.00000000 03 | 58.246  | 6.472  | 0.027891 | 10 | 41.152    |
| 0.00000000 03  | -0.00000000 03 | 0.00000000 03 | 330.349 | 33.340 | 0.021821 |    |           |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 925 FLT 604.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.48074411 03 |                |               |         |        |          | 1  | 4.115     |
| 0.10780700 04  | 0.14494548 04  | 0.22304555 04 | 41.212  | 41.212 | 1.000000 | 2  | 8.230     |
| -0.11050151 04 | 0.32977568 03  | 0.11531738 04 | 163.783 | 81.642 | 0.516966 | 3  | 12.346    |
| 0.00000000 03  | 0.00000000 03  | 0.00000000 03 | 131.923 | 43.974 | 0.233494 | 4  | 16.461    |
| -0.00000000 03 | -0.00000000 03 | 0.00000000 03 | 203.753 | 50.938 | 0.186033 | 5  | 20.576    |
| -0.00000000 03 | 0.00000000 03  | 0.00000000 03 | 151.495 | 30.299 | 0.256925 | 6  | 24.691    |
| 0.00000000 02  | 0.00000000 03  | 0.00000000 03 | 281.677 | 46.946 | 0.186285 | 7  | 28.807    |
| -0.00000000 02 | -0.00000000 03 | 0.00000000 03 | 268.306 | 38.329 | 0.172659 | 8  | 32.922    |
| -0.00000000 02 | 0.00000000 03  | 0.00000000 03 | 96.093  | 12.012 | 0.296587 | 9  | 37.037    |
| -0.00000000 03 | -0.00000000 02 | 0.00000000 02 | 186.100 | 20.900 | 0.093360 | 10 | 41.152    |
| -0.00000000 02 | 0.00000000 02  | 0.00000000 03 | 159.921 | 15.952 | 0.049346 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 17 V= 121 KTS n= 1.13 g

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## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 763 FLT 604.0 TR 31

| AJ              | PJ              | CJ             | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|-----------------|-----------------|----------------|---------|---------|----------|----|-----------|
| 0.5474246F J1   | -0.2655570F 01  | 0.5379322E 01  | 328.478 | 328.478 | 1.000000 | 1  | 4.133     |
| 0.5379322E 01   | -0.1225179F 00  | 0.1271227E 00  | 254.531 | 127.266 | 0.325327 | 2  | 8.264     |
| -0.3390517F -01 | -0.6533876F -01 | 0.1743998E -01 | 228.028 | 76.009  | 0.017215 | 3  | 12.397    |
| -0.5564750F -01 | -0.4355494F -01 | 0.1770995E -01 | 251.676 | 67.919  | 0.017244 | 4  | 16.529    |
| -0.2116095F -01 | -0.2522159E -01 | 0.3051619E -01 | 251.287 | 53.257  | 0.006087 | 5  | 20.661    |
| -0.0916503F -02 | -0.1433976F -01 | 0.2537672F -01 | 325.387 | 54.231  | 0.004764 | 6  | 24.793    |
| -0.2374955F -01 | -0.3147856F -01 | 0.1761177E -01 | 234.510 | 33.501  | 0.037602 | 7  | 28.926    |
| -0.2241615F -01 | 0.7319505F -03  | 0.1532016E -01 | 177.262 | 22.154  | 0.031016 | 8  | 33.058    |
| -0.1522675F -01 | 0.6655151E -02  | 0.1663416E -02 | 87.495  | 9.722   | 0.001706 | 9  | 37.190    |
| 0.33751353F -02 | -0.1662279F -01 | 0.1166573E -01 | 248.070 | 24.403  | 0.002257 | 10 | 41.322    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 763 FLT 604.0 TR 36

| AJ             | PJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2236875F 04 | 0.5532531F 05  | 0.5514931F 05 | 110.036 | 110.036 | 1.000000 | 1  | 4.132     |
| -0.2217415F 05 | -0.1442038F 04 | 0.2143562E 04 | 221.402 | 110.701 | 0.037028 | 2  | 8.264     |
| -0.1039557E 04 | -0.1545976F 05 | 0.2191030F 05 | 297.359 | 99.120  | 0.372064 | 3  | 12.397    |
| -0.3740823F 02 | -0.2372412F 03 | 0.2537672F 03 | 261.726 | 65.431  | 0.004414 | 4  | 16.529    |
| -0.5794566F 04 | 0.2573848F 04  | 0.0513145E 04 | 152.832 | 30.566  | 0.110600 | 5  | 20.661    |
| -0.6113897F 03 | 0.2521980E 03  | 0.0652337E 03 | 136.788 | 26.131  | 0.011296 | 6  | 24.793    |
| 0.2555272F 04  | -0.3186151E 04 | 0.4036112E 04 | 306.762 | 44.109  | 0.069386 | 7  | 28.926    |
| -0.2539105E 03 | -0.6755273E 03 | 0.9235130E 03 | 251.443 | 31.433  | 0.015683 | 8  | 33.058    |
| -0.1587706F 04 | 0.1250049F 04  | 0.2021794E 04 | 141.520 | 15.724  | 0.036332 | 9  | 37.190    |
| 0.0539035E 02  | 0.4301867F 03  | 0.4351044F 03 | 81.357  | 8.136   | 0.007389 | 10 | 41.322    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 763 FLT 604.0 TR 11

| AJ             | PJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1132432E J2  | -0.6180571F 02 | 0.1755619E 03 | 211.251 | 211.251 | 0.978997 | 1  | 4.132     |
| -0.1132432E 02 | -0.7205345F 02 | 0.1493141F 03 | 331.082 | 165.542 | 0.224382 | 2  | 8.264     |
| 0.1304759F 03  | -0.1771216F 03 | 0.1137587E 03 | 281.513 | 53.838  | 1.733333 | 3  | 12.397    |
| -0.1132432E 02 | -0.3873575F 02 | 0.4035547E 02 | 252.769 | 63.427  | 0.273259 | 4  | 16.529    |
| -0.2048447F 02 | -0.5556451F 02 | 0.4344197F 02 | 250.598 | 50.200  | 0.350976 | 5  | 20.661    |
| 0.4411255F 01  | -0.1381372F 02 | 0.1449812E 02 | 287.714 | 47.952  | 0.333237 | 6  | 24.793    |
| 0.1755619E 03  | 0.1058701F 02  | 0.1573390E 02 | 34.474  | 4.925   | 0.106406 | 7  | 28.926    |
| -0.0416614F 01 | 0.1052804F 02  | 0.1243460F 02 | 127.148 | 15.769  | 0.068751 | 8  | 33.058    |
| -0.1522675F 02 | -0.1433151F 02 | 0.2243773F 02 | 219.762 | 24.418  | 0.121965 | 9  | 37.190    |
| -0.1367680F 02 | -0.2162317F 02 | 0.4002110E 02 | 212.764 | 21.270  | 0.271406 | 10 | 41.322    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 763 FLT 604.0 TR 1

| AJ             | PJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1532675F 04 | 0.1041555F 05  | 0.1347832E 05 | 87.215  | 87.215  | 1.000000 | 1  | 4.132     |
| 0.5379322E 01  | -0.3670898F 04 | 0.4484285E 04 | 305.054 | 152.527 | 0.477955 | 2  | 8.264     |
| -0.8615434F 03 | -0.3125414F 04 | 0.3247545E 04 | 254.458 | 64.833  | 0.309930 | 3  | 12.397    |
| -0.7018653F 03 | -0.7728375F 03 | 0.1343811E 04 | 227.748 | 56.937  | 0.390618 | 4  | 16.529    |
| -0.2546456F 02 | -0.1468777F 03 | 0.2551900F 02 | 330.158 | 66.032  | 0.229172 | 5  | 20.661    |
| -0.2425071F 03 | -0.0585365F 03 | 0.5706870E 02 | 254.856 | 42.483  | 0.088520 | 6  | 24.793    |
| -0.1132432F 03 | 0.1388815F 03  | 0.2234555E 03 | 141.315 | 23.146  | 0.321343 | 7  | 28.926    |
| 0.4411255E 03  | 0.5264070E 03  | 0.4871025E 02 | 50.017  | 6.752   | 0.065574 | 8  | 33.058    |
| -0.3180957F 02 | 0.2144037F 03  | 0.2164081F 03 | 97.593  | 10.884  | 0.020672 | 9  | 37.190    |
| -0.1460150F 03 | 0.3636403F 03  | 0.3950275F 03 | 114.527 | 11.453  | 0.338167 | 10 | 41.322    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 17 V= 121 KTS n= 1.13 g

FIXED INB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1000 T 460 CTR 763 FLT 604.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.7010330E 05  |                |               |         |        |          | 1  | 4.132     |
| 0.3021115E 04  | 0.0265859E 05  | 0.5024291E 05 | 66.342  | 66.342 | 1.000000 | 2  | 8.264     |
| 0.7021115E 04  | 0.7021115E 04  | 0.7021115E 04 | 71.245  | 75.633 | 0.082154 | 3  | 12.397    |
| 0.1132542E 04  | -0.9522402E 04 | 0.0000000E 04 | 276.511 | 52.173 | 0.113666 | 4  | 16.529    |
| -0.3156743E 04 | 0.1667674E 04  | 0.2175279E 04 | 129.549 | 32.487 | 0.124105 | 5  | 20.661    |
| 0.2560476E 03  | -0.2342774E 03 | 0.3409804E 03 | 41.215  | 8.243  | 0.003772 | 6  | 24.793    |
| -0.0222576E 03 | -0.4566552E 03 | 0.7562188E 03 | 210.556 | 36.433 | 0.039823 | 7  | 28.926    |
| -0.1162144E 03 | 0.2852612E 03  | 0.3161160E 03 | 115.525 | 16.504 | 0.003503 | 8  | 33.058    |
| 0.1426424E 04  | 0.5203027E 03  | 0.1512715E 04 | 20.116  | 2.515  | 0.016762 | 9  | 37.190    |
| -0.3515000E 02 | -0.5277749E 03 | 0.1016217E 04 | 247.241 | 27.482 | 0.011261 | 10 | 41.322    |
| 0.2255027E 03  | -0.1555315E 03 | 0.2055374E 03 | 320.822 | 22.083 | 0.003430 |    |           |

BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1000 T 460 CTR 763 FLT 604.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1017255E 04  |                |               |         |         |          | 1  | 4.132     |
| 0.7011177E 04  | -0.3031669E 04 | 0.4519719E 04 | 371.920 | 121.920 | 1.000000 | 2  | 8.264     |
| -0.2467703E 04 | 0.2664402E 03  | 0.2663576E 04 | 174.256 | 47.148  | 0.545356 | 3  | 12.397    |
| -0.0150051E 01 | 0.1430015E 04  | 0.1430015E 04 | 40.349  | 10.114  | 0.291748 | 4  | 16.529    |
| -0.1706830E 03 | -0.2361133E 03 | 0.2045413E 03 | 232.266 | 59.321  | 0.055882 | 5  | 20.661    |
| -0.3755044E 03 | -0.0001436E 02 | 0.3451235E 03 | 103.555 | 19.712  | 0.037316 | 6  | 24.793    |
| 0.2456571E 02  | -0.5647412E 03 | 0.5657556E 03 | 273.505 | 45.584  | 0.115030 | 7  | 28.926    |
| 0.1774037E 02  | -0.1631761E 03 | 0.2451582E 03 | 210.054 | 45.442  | 0.049882 | 8  | 33.058    |
| 0.2142449E 03  | 0.5725305E 03  | 0.6325288E 03 | 69.112  | 8.639   | 0.172457 | 9  | 37.190    |
| -0.0756442E 02 | 0.2774639E 03  | 0.2750711E 03 | 103.768 | 11.530  | 0.058078 | 10 | 41.322    |
| -0.2262585E 02 | 0.2321093E 03  | 0.2746157E 03 | 96.526  | 9.693   | 0.047658 |    |           |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1000 T 460 CTR 763 FLT 604.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.3101762E 05  |                |               |         |        |          | 1  | 4.132     |
| 0.4228379E 04  | 0.2040455E 05  | 0.2084005E 05 | 78.294  | 78.294 | 1.000000 | 2  | 8.264     |
| 0.1235746E 04  | 0.2521783E 04  | 0.2814571E 04 | 63.956  | 31.978 | 0.135056 | 3  | 12.397    |
| 0.8637034E 03  | -0.4572191E 04 | 0.4653051E 04 | 260.897 | 93.566 | 0.233274 | 4  | 16.529    |
| 0.1012749E 04  | 0.1046643E 04  | 0.1492744E 04 | 47.278  | 11.819 | 0.071629 | 5  | 20.661    |
| -0.7734326E 02 | -0.4217727E 03 | 0.6809597E 03 | 208.605 | 41.721 | 0.042272 | 6  | 24.793    |
| -0.5534507E 03 | 0.2705440E 03  | 0.2273445E 03 | 164.100 | 17.350 | 0.010911 | 7  | 28.926    |
| 0.3889883E 03  | -0.0596251E 02 | 0.3983735E 03 | 347.538 | 49.648 | 0.019116 | 8  | 33.058    |
| 0.6458652E 03  | -0.4481604E 03 | 0.7885898E 03 | 325.368 | 40.471 | 0.037840 | 9  | 37.190    |
| -0.2142247E 03 | 0.6977073E 03  | 0.7298545E 03 | 107.069 | 11.897 | 0.035022 | 10 | 41.322    |
| -0.1295540E 02 | 0.2179125E 03  | 0.2182973E 03 | 93.402  | 9.340  | 0.010475 |    |           |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AH-56A SHIP 1000 T 460 CTR 763 FLT 604.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.2893416E 03 |                |               |         |        |          | 1  | 4.132     |
| 0.1677294E 04  | 0.1766540E 04  | 0.2435990E 04 | 44.485  | 44.485 | 1.000000 | 2  | 8.264     |
| -0.1195112E 04 | 0.1844633E 03  | 0.1209262E 04 | 171.226 | 85.613 | 0.496415 | 3  | 12.397    |
| -0.2275612E 03 | 0.7899075E 03  | 0.3685518E 03 | 128.130 | 42.710 | 0.151294 | 4  | 16.529    |
| -0.2782463E 03 | -0.6358404E 02 | 0.2854209E 03 | 192.872 | 48.218 | 0.117168 | 5  | 20.661    |
| -0.6481178E 03 | 0.1612632E 03  | 0.6679761E 03 | 166.030 | 33.206 | 0.274211 | 6  | 24.793    |
| 0.1507474E 03  | -0.4357754E 03 | 0.6542014E 03 | 286.952 | 47.875 | 0.268557 | 7  | 28.926    |
| 0.1031944E 03  | -0.3371362E 03 | 0.3525762E 03 | 287.019 | 41.003 | 0.144736 | 8  | 33.058    |
| -0.1787366E 03 | 0.4568331E 02  | 0.4903677E 02 | 111.377 | 13.922 | 0.201301 | 9  | 37.190    |
| -0.1751367E 03 | 0.3767369E 02  | 0.1791449E 03 | 167.860 | 15.651 | 0.073541 | 10 | 41.322    |
| -0.1713606E 03 | 0.1345046E 02  | 0.1719074E 03 | 175.512 | 17.551 | 0.070570 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 18 V= 118.5 KTS n= 1.12 g

BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1005 T 469 CTR 534 FLT 604.0 TR 31

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| C.5464845F C1  | -1.263534JF J1 | 3.4877728E J1 | 327.297 | 327.297 | 1.333333 | 1  | 4.098     |
| C.4104936F C1  | -0.1106868F 00 | 0.1435671F 00 | 222.587 | 111.293 | 0.033577 | 2  | 8.197     |
| -C.1204269F C0 | -0.6547520F-01 | 0.654521CF-01 | 210.011 | 76.670  | 0.017520 | 3  | 12.295    |
| -C.5451893F-01 | -0.2584810F-01 | 3.2746128E-01 | 269.522 | 72.381  | 3.335631 | 4  | 16.393    |
| -C.9177968F-02 | 0.1255150F-01  | 0.7608419F-01 | 20.405  | 4.081   | 0.007198 | 5  | 20.492    |
| -C.1271222F-01 | -0.3087202F-02 | 0.1259247E-01 | 345.502 | 57.650  | 0.072582 | 6  | 24.590    |
| -C.1702200F-01 | 0.1627426F-01  | 3.2376891E-01 | 125.857 | 17.983  | 3.334973 | 7  | 28.689    |
| -C.7037906F-02 | -0.3150571F-02 | 0.7717628F-02 | 335.515 | 41.939  | 0.001582 | 8  | 32.787    |
| -C.6265467E-02 | -0.8185678F-04 | 0.6290000E-02 | 180.746 | 20.083  | 0.001290 | 9  | 36.885    |
| -C.2244607E-02 | -1.2851446F-02 | 0.3660001E-02 | 338.824 | 33.882  | 3.333753 | 10 | 40.984    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1007 T 469 CTR 334 FLT 604.0 TR 36

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.7987672F 06 | 0.5573188E C5  | 0.5610771E 03 | 106.434 | 106.434 | 1.000000 | 1  | 4.098     |
| -0.1643675F C5 | -0.1467678E 04 | 0.1333715E 04 | 234.302 | 117.151 | 0.031145 | 2  | 8.197     |
| -0.1955590E C4 | -0.2124613F C5 | 0.2132834E 05 | 273.190 | 91.050  | 0.367061 | 3  | 12.295    |
| -0.8670465F 02 | 0.2651355F C3  | 0.2777135E 03 | 138.056 | 27.315  | 0.004814 | 4  | 16.393    |
| -0.4383850E C4 | 0.3608877E 04  | 0.8133017E 04 | 143.641 | 28.728  | 0.106506 | 5  | 20.492    |
| -0.4236842F C3 | -0.1755423F 02 | 0.7237722E 03 | 359.222 | 59.870  | 0.015898 | 6  | 24.590    |
| -0.3236594F 03 | -0.4193653F 04 | 0.4202934E 04 | 274.417 | 39.202  | 0.072333 | 7  | 28.689    |
| -0.4499171F 03 | 0.1464001F 04  | 0.1551635E 04 | 108.500 | 13.562  | 0.026532 | 8  | 32.787    |
| -0.3677681E 03 | 0.1381871F C4  | 0.1427773E 04 | 104.904 | 11.656  | 0.024610 | 9  | 36.885    |
| -0.3300557E 03 | 0.5013015F C3  | 0.5049772E 03 | 120.928 | 12.053  | 0.010068 | 10 | 40.984    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1005 T 469 CTR 534 FLT 604.0 TR 11

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -C.1752248F C2 | -0.1000695F 03 | 0.1757214E 03 | 213.835 | 213.835 | 3.913289 | 1  | 4.098     |
| -C.1492849F C3 | -1.7366607F 02 | 0.1499773E 03 | 329.554 | 164.777 | 0.736335 | 2  | 8.197     |
| -C.1253311F C3 | -0.176021F 02  | 0.1974335E 03 | 263.096 | 87.699  | 1.000000 | 3  | 12.295    |
| -C.7731145F C2 | -0.4150702F C2 | 0.4032415E 02 | 235.155 | 55.000  | 7.244762 | 4  | 16.393    |
| -C.7474510F C2 | -0.5155851F 02 | 0.5789696E 02 | 243.026 | 48.605  | 0.293248 | 5  | 20.492    |
| -C.3226123F 02 | 0.2764510F C1  | 0.1674735E 02 | 170.846 | 28.474  | 0.044928 | 6  | 24.590    |
| -C.1657657F C2 | 0.1070074E 02  | 0.1471709E 02 | 43.510  | 6.273   | 0.074542 | 7  | 28.689    |
| -C.1060260F 02 | 0.1364333F 02  | 3.1701126F 02 | 78.540  | 9.870   | 0.070460 | 8  | 32.787    |
| -C.2444324F 01 | -0.2005736F C2 | 0.2457179E 02 | 222.442 | 24.716  | 0.153510 | 9  | 36.885    |
| -C.9192027C C2 | -0.8310157F 01 | 0.4074119F 02 | 191.220 | 15.124  | 0.215977 | 10 | 40.984    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1005 T 469 CTR 534 FLT 604.0 TR 1

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.4576215F C4 | 0.1015400F 04  | 0.1019009E 05 | 89.973  | 89.973  | 1.000000 | 1  | 4.098     |
| -C.4371271F C1 | -0.2470644F 04 | 0.3679493E 04 | 317.820 | 158.913 | 3.763832 | 2  | 8.197     |
| -C.2326645F C4 | -0.4018117F C4 | 0.4426556E 04 | 245.181 | 81.727  | 0.434100 | 3  | 12.295    |
| -C.1010150F C1 | -0.854414F 03  | 0.1740001E 04 | 223.177 | 55.794  | 0.122474 | 4  | 16.393    |
| -C.1546810F 03 | -0.8336790F 03 | 0.755529E 03  | 293.047 | 58.609  | 3.389335 | 5  | 20.492    |
| -C.1727475F 01 | -0.4400428F 03 | 0.4402774E 03 | 249.428 | 41.571  | 0.047090 | 6  | 24.590    |
| -C.5544949F C2 | 0.4029496F 03  | 0.4727447E 03 | 74.311  | 11.187  | 0.046317 | 7  | 28.689    |
| -C.9258520F C2 | 0.3277619F 03  | 0.7506013F 03 | 74.156  | 9.270   | 0.033355 | 8  | 32.787    |
| -C.1440577F 02 | 0.3515253F 02  | 0.1481274F 03 | 13.705  | 1.523   | 0.014544 | 9  | 36.885    |
| -C.4476605F C2 | 0.4574414F 02  | 0.1047704F 03 | 154.114 | 15.411  | 0.010274 | 10 | 40.984    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 18 V= 118.5 KTS n= 1.12 g

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 934 FLT 634.0 TR 3

| AJ          |    | HJ          |    | CJ         |    | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|-------------|----|-------------|----|------------|----|---------|--------|----------|----|-----------|
| C.55728800  | C5 |             |    |            |    |         |        |          |    |           |
| C.77051460  | C5 | 1.7011131F  | C5 | 0.4581613E | 05 | 67.065  | 67.065 | 1.000000 | 1  | 4.058     |
| C.78452280  | C4 | 1.7135515E  | J4 | 0.4137551E | J4 | 61.656  | 33.020 | 0.535593 | 2  | 8.197     |
| C.76507320  | C4 | -0.10854920 | 05 | 0.11102745 | 05 | 203.523 | 54.641 | 0.271847 | 3  | 12.295    |
| -C.11249070 | C4 | 1.17758005  | C4 | 0.2105478E | 04 | 122.292 | 70.573 | 0.024024 | 4  | 16.393    |
| C.18649070  | C5 | -1.7111313F | J5 | 0.7757305E | J5 | 311.325 | 62.236 | 0.203250 | 5  | 20.492    |
| C.53767350  | 02 | -0.1033714E | C4 | 0.1039170E | 04 | 272.561 | 45.494 | 0.012251 | 6  | 24.590    |
| -C.10129510 | C4 | -0.1170771E | 04 | 0.1549170E | 04 | 224.122 | 32.733 | 0.010253 | 7  | 28.689    |
| -C.71658840 | C2 | 1.1387003E  | J4 | 0.1363425E | J4 | 93.242  | 11.655 | 0.128850 | 8  | 32.797    |
| C.14618380  | C7 | -0.3187046E | 07 | 0.7504858E | 07 | 254.826 | 32.737 | 0.004135 | 9  | 36.885    |
| -C.25073310 | 02 | -0.1414036E | 03 | 0.1543613E | 03 | 258.382 | 25.838 | 0.001702 | 10 | 40.984    |

BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 934 FLT 634.0 TR 50

| AJ          |    | HJ          |    | CJ         |    | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|-------------|----|-------------|----|------------|----|---------|---------|----------|----|-----------|
| C.74055570  | C4 |             |    |            |    |         |         |          |    |           |
| C.75403570  | C4 | -0.5466888E | C4 | 0.4469465E | 04 | 315.762 | 315.762 | 1.000000 | 1  | 4.058     |
| -C.72853320 | C4 | 1.0346609E  | J3 | 0.7570667E | J4 | 161.727 | 81.863  | 0.599354 | 2  | 8.197     |
| C.56444280  | C2 | 0.1427507E  | 04 | 0.1722056E | 04 | 70.873  | 23.424  | 0.346645 | 3  | 12.295    |
| -C.76446890 | C7 | -0.2303921E | 07 | 0.4511404E | 07 | 212.294 | 53.075  | 0.086764 | 4  | 16.393    |
| -J.72622880 | J3 | -1.1178434E | J3 | 0.3491118E | J3 | 194.735 | 39.947  | 0.070255 | 5  | 20.492    |
| -C.14555370 | C7 | -0.4005605E | 07 | 0.5220171E | 07 | 251.778 | 42.230  | 0.175206 | 6  | 24.590    |
| C.74043350  | C3 | -0.1253514E | 03 | 0.7016002E | 07 | 347.823 | 44.689  | 0.076751 | 7  | 28.689    |
| C.34606760  | J3 | 1.7365476E  | J3 | 0.7776238E | J3 | 61.773  | 7.972   | 0.158457 | 8  | 32.797    |
| C.18604570  | C7 | 0.4257734E  | 07 | 0.4657392E | 03 | 61.194  | 7.355   | 0.094525 | 9  | 36.885    |
| C.60553070  | C2 | 0.2255201E  | 03 | 0.2329722E | 07 | 74.725  | 7.497   | 0.047082 | 10 | 40.984    |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 934 FLT 604.0 TR 42

| AJ          |    | HJ          |    | CJ         |    | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|-------------|----|-------------|----|------------|----|---------|--------|----------|----|-----------|
| 0.2912040E  | 05 |             |    |            |    |         |        |          |    |           |
| 0.4970084E  | C4 | 0.1925486E  | 05 | 0.1998812E | 05 | 75.526  | 75.526 | 1.000000 | 1  | 4.058     |
| 0.1990470E  | C4 | 0.2231244E  | 04 | 0.2065393E | 04 | 49.509  | 24.755 | 0.154132 | 2  | 8.197     |
| -0.14739620 | 03 | -0.4893531E | 04 | 0.4695750E | 04 | 268.275 | 89.425 | 0.264165 | 3  | 12.295    |
| 0.14035750  | C4 | 0.1205021E  | 04 | 0.1805524E | 04 | 42.020  | 10.507 | 0.095008 | 4  | 16.393    |
| -0.11021450 | 04 | -0.3566590E | 02 | 0.1102096E | 04 | 182.061 | 36.412 | 0.055455 | 5  | 20.492    |
| 0.6794215E  | 02 | -0.2031987E | 07 | 0.7091563E | 02 | 343.349 | 57.225 | 0.003566 | 6  | 24.590    |
| 0.3525024E  | 03 | -0.2577710E | 07 | 0.3534431E | 03 | 355.818 | 50.831 | 0.017772 | 7  | 28.689    |
| C.10020140  | C4 | -0.2214604E | 02 | 0.1295696E | 04 | 320.655 | 40.082 | 0.065149 | 8  | 32.797    |
| -0.2630234E | C2 | 0.4701843E  | 03 | 0.5387527E | 03 | 119.723 | 13.247 | 0.027089 | 9  | 36.885    |
| -0.3661166E | C7 | 0.8231310E  | 02 | 0.9106273E | 02 | 113.723 | 11.377 | 0.064576 | 10 | 40.984    |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 934 FLT 604.0 TR 44

| AJ          |    | HJ          |    | CJ         |    | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|-------------|----|-------------|----|------------|----|---------|--------|----------|----|-----------|
| -0.4019707E | 02 |             |    |            |    |         |        |          |    |           |
| 0.1554683E  | 04 | 0.1467644E  | 04 | 0.2138128E | 04 | 43.347  | 43.347 | 1.000000 | 1  | 4.058     |
| -0.1189470E | C4 | 0.2854175E  | 03 | 0.1223699E | 04 | 166.412 | 83.246 | 0.572322 | 2  | 8.197     |
| -0.1605059E | C3 | 0.4147170E  | 03 | 0.4446936E | 03 | 111.158 | 37.053 | 0.207983 | 3  | 12.295    |
| -0.3324452E | 03 | 0.4119899E  | 02 | 0.3351072E | 03 | 172.936 | 43.234 | 0.156729 | 4  | 16.393    |
| -0.5269360E | 03 | 0.3635633E  | 03 | 0.6403577E | 03 | 145.374 | 29.075 | 0.299495 | 5  | 20.492    |
| -0.1703951E | 02 | -0.6246553E | 03 | 0.6474788E | 03 | 254.742 | 42.457 | 0.302825 | 6  | 24.590    |
| -0.3559306E | 03 | -0.3201282E | 03 | 0.3224554E | 03 | 263.124 | 37.589 | 0.150812 | 7  | 28.689    |
| C.1534240E  | 03 | 0.5715264E  | 03 | 0.5919065E | 02 | 74.921  | 9.365  | 0.276834 | 8  | 32.797    |
| -0.1027710E | 07 | 0.1277701E  | 07 | 0.1639572E | 03 | 128.816 | 14.313 | 0.076683 | 9  | 36.885    |
| -0.9131416E | 02 | 0.1195209E  | 03 | 0.1504118E | 03 | 127.380 | 12.738 | 0.070347 | 10 | 40.984    |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 19 V= 121.5 KTS n= 1.26 g

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BLADE FEATHER ANGLE  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 469 CTR 773 FLT 634.0 TR 31

| AJ             | PJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.00000000 C1  | -0.23474745 C1 | 0.44705428 C1 | 330.555 | 330.959 | 1.000000 | 1  | 4.132     |
| 0.47100555 C1  | -0.56829745 C1 | 0.12787045 C0 | 229.772 | 114.611 | 0.325934 | 2  | 8.264     |
| -0.82516101 C1 | 0.47450045 C2  | 0.27525628 C1 | 171.005 | 57.003  | 0.095644 | 3  | 12.397    |
| -0.71487715 C1 | -0.71116315 C1 | 0.21517075 C1 | 250.564 | 84.741  | 0.004384 | 4  | 16.529    |
| -0.41178457 C2 | 0.11803185 C1  | 0.17821845 C1 | 100.466 | 21.893  | 0.333615 | 5  | 20.661    |
| -0.56389845 C2 | 0.15226585 C1  | 0.17551405 C1 | 65.225  | 11.388  | 0.007697 | 6  | 24.793    |
| 0.14314515 C1  | 0.27875505 C1  | 0.27535105 C1 | 84.518  | 12.131  | 0.005646 | 7  | 28.926    |
| 0.74744275 C2  | 0.18604535 C1  | 0.20819565 C1 | 127.102 | 15.888  | 0.334221 | 8  | 33.058    |
| -0.12759055 C1 | 0.12435755 C1  | 0.12777295 C1 | 103.256 | 11.477  | 0.002552 | 9  | 37.190    |
| -0.27588145 C2 | 0.11162145 C1  | 0.11177145 C1 | 87.052  | 8.705   | 0.002267 | 10 | 41.322    |

SHAFT MOMENT  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 469 CTR 770 FLT 604.0 TR 36

| AJ             | PJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.71265435 C4 | 0.60048745 C5  | 0.71265135 C5 | 122.785 | 122.785 | 1.000000 | 1  | 4.132     |
| -0.38674215 C5 | -0.11156025 C4 | 0.11380355 C5 | 291.536 | 140.768 | 0.015941 | 2  | 8.264     |
| 0.22777035 C3  | -0.17274035 C5 | 0.16391435 C5 | 291.926 | 97.309  | 0.260409 | 3  | 12.397    |
| 0.69453595 C4  | 0.40230625 C2  | 0.12292655 C3 | 160.897 | 40.224  | 0.001721 | 4  | 16.529    |
| -0.11615655 C3 | 0.14479915 C3  | 0.72063575 C5 | 179.007 | 35.801  | 0.100868 | 5  | 20.661    |
| -0.72031555 C4 | -0.21874075 C2 | 0.73223425 C5 | 353.412 | 59.735  | 0.011050 | 6  | 24.793    |
| 0.78895095 C3  | -0.30463525 C4 | 0.33519015 C4 | 307.924 | 43.983  | 0.054068 | 7  | 28.926    |
| 0.23736005 C4  | -0.44666505 C2 | 0.12283755 C5 | 183.018 | 22.877  | 0.017198 | 8  | 33.058    |
| -0.12766745 C4 | 0.14716775 C4  | 0.25313035 C5 | 144.461 | 18.051  | 0.035447 | 9  | 37.190    |
| -0.23602145 C5 | 0.37762825 C3  | 0.37762825 C3 | 108.207 | 10.321  | 0.005566 | 10 | 41.322    |

PITCH LINK TENSION  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 469 CTR 770 FLT 604.0 TR 11

| AJ             | PJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.76545365 C2  | -0.12554215 C3 | 0.17026795 C3 | 227.504 | 227.504 | 0.951665 | 1  | 4.132     |
| -0.11502735 C3 | -0.85324715 C2 | 0.17841595 C3 | 331.517 | 165.758 | 1.007000 | 2  | 8.264     |
| 0.15779555 C3  | 0.14525755 C3  | 0.14525755 C3 | 273.745 | 50.250  | 0.710804 | 3  | 12.397    |
| -0.15545335 C1 | -0.25563575 C2 | 0.39612815 C2 | 225.544 | 56.486  | 0.199048 | 4  | 16.529    |
| -0.24361325 C2 | -0.63040045 C2 | 0.63218295 C2 | 265.656 | 53.139  | 0.353341 | 5  | 20.661    |
| -0.47474585 C1 | -0.18486555 C2 | 0.31248315 C2 | 295.538 | 45.723  | 0.119761 | 6  | 24.793    |
| 0.12679525 C2  | 0.07077005 C1  | 0.11750165 C2 | 35.269  | 5.610   | 0.076853 | 7  | 28.926    |
| 0.10649165 C2  | -0.15871195 C0 | 0.10213665 C2 | 101.115 | 22.639  | 0.057086 | 8  | 33.058    |
| -0.10711325 C2 | -0.33003555 C2 | 0.33003555 C2 | 238.332 | 26.448  | 0.231642 | 9  | 37.190    |
| -0.15434685 C2 | -0.81511625 C1 | 0.36265095 C2 | 143.016 | 19.302  | 0.203215 | 10 | 41.322    |

FIXED HUB FLAP AT STA 18  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 469 CTR 770 FLT 604.0 TR 1

| AJ             | PJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.35511605 C4  | 0.11317015 C5  | 0.11850345 C5 | 107.250 | 107.250 | 1.000000 | 1  | 4.132     |
| -0.35511605 C4 | -0.12554215 C3 | 0.5162885 C4  | 320.895 | 160.447 | 0.436111 | 2  | 8.264     |
| 0.40125315 C4  | -0.25758325 C4 | 0.26547675 C4 | 255.553 | 65.331  | 0.224015 | 3  | 12.397    |
| -0.64225555 C2 | -0.33814555 C3 | 0.10007085 C4 | 100.562 | 45.891  | 0.035217 | 4  | 16.529    |
| -0.55110505 C3 | -0.34773325 C3 | 0.57275685 C2 | 207.832 | 58.766  | 0.044955 | 5  | 20.661    |
| 0.27152615 C3  | -0.48026795 C3 | 0.48027705 C3 | 272.637 | 45.439  | 0.040565 | 6  | 24.793    |
| 0.22114745 C2  | 0.55875775 C2  | 0.27298855 C3 | 19.798  | 2.828   | 0.023878 | 7  | 28.926    |
| 0.50879715 C3  | 0.50879715 C3  | 0.77453175 C3 | 48.933  | 6.117   | 0.065354 | 8  | 33.058    |
| 0.15432145 C3  | 0.22025675 C3  | 0.25358885 C3 | 48.521  | 5.391   | 0.024807 | 9  | 37.190    |
| -0.30377525 C3 | 0.13529135 C3  | 0.33437305 C3 | 155.282 | 15.538  | 0.020215 | 10 | 41.322    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 19 V= 121.5 KTS n= 1.26 g

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 449 CTR 770 FLT 604.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.7115639E 04  | 0.8711450E 05  | 0.5545775E 05 | 65.867  | 65.867 | 1.000000 | 1  | 4.132     |
| 0.3502765E 05  | 0.3885695E 04  | 0.3823104E 04 | 98.407  | 49.203 | 0.041150 | 2  | 8.264     |
| -0.5142049E 03 | -0.1046793E 04 | 0.1107271E 05 | 289.323 | 56.341 | 0.115951 | 3  | 12.397    |
| 0.3008571E 04  | 0.4249124E 03  | 0.2355750E 04 | 169.605 | 42.402 | 0.074674 | 4  | 16.529    |
| -0.8773767E 04 | 0.1076084E 03  | 0.8800054E 03 | 172.963 | 34.593 | 0.009215 | 5  | 20.661    |
| -0.4330771E 03 | -0.1415610E 04 | 0.1400393E 04 | 252.593 | 42.165 | 0.015578 | 6  | 24.793    |
| -0.5107324E 03 | -0.1016657E 04 | 0.1160105E 04 | 241.205 | 34.458 | 0.012157 | 7  | 28.926    |
| 0.7210456E 03  | 0.9156757E 03  | 0.1165653E 04 | 51.787  | 6.473  | 0.012211 | 8  | 33.058    |
| 0.6764465E 03  | -0.1151396E 04 | 0.1747823E 04 | 257.646 | 33.377 | 0.014123 | 9  | 37.190    |
| 0.6157593E 03  | 0.4771157E 03  | 0.7547272E 03 | 34.352  | 1.539  | 0.007906 | 10 | 41.322    |

BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 449 CTR 770 FLT 604.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2452400E 04  | -0.2987432E 04 | 0.4577629E 04 | 323.175 | 323.175 | 1.000000 | 1  | 4.132     |
| 0.3502765E 05  | 0.2901074E 03  | 0.2961741E 04 | 174.940 | 67.495  | 0.575322 | 2  | 8.264     |
| -0.3152754E 04 | 0.1325564E 04  | 0.1349685E 04 | 103.625 | 34.542  | 0.274843 | 3  | 12.397    |
| -0.3222781E 03 | -0.1511954E 02 | 0.1354744E 03 | 186.225 | 46.556  | 0.029012 | 4  | 16.529    |
| -0.1386122E 03 | -0.4011249E 03 | 0.4126687E 03 | 237.250 | 47.250  | 0.004968 | 5  | 20.661    |
| -0.9681532E 03 | -0.4880381E 03 | 0.5072761E 03 | 303.794 | 10.633  | 0.117083 | 6  | 24.793    |
| 0.3266685E 03  | -0.2333294E 03 | 0.2645813E 03 | 205.610 | 42.801  | 0.053154 | 7  | 28.926    |
| 0.1333278E 03  | 0.6754787E 03  | 0.6756656E 03 | 98.446  | 11.056  | 0.135745 | 8  | 33.058    |
| 0.1870051E 02  | 0.3045456E 03  | 0.3526062E 03 | 120.134 | 13.348  | 0.070878 | 9  | 37.190    |
| -0.1370247E 03 | 0.2697490E 03  | 0.2422625E 03 | 82.466  | 8.247   | 0.058721 | 10 | 41.322    |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 449 CTR 770 FLT 604.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2945275E 05  | 0.2101600E 05  | 0.2191642E 05 | 73.538  | 73.538 | 1.000000 | 1  | 4.132     |
| 0.6210742E 04  | 0.1732496E 04  | 0.2056489E 04 | 57.400  | 28.700 | 0.093833 | 2  | 8.264     |
| 0.1107972E 04  | -0.4719922E 04 | 0.4783688E 04 | 279.365 | 93.122 | 0.218270 | 3  | 12.397    |
| 0.7764626E 03  | 0.1616651E 04  | 0.1678941E 04 | 74.344  | 18.586 | 0.076607 | 4  | 16.529    |
| 0.4530830E 03  | 0.5557036E 02  | 0.7402544E 02 | 48.650  | 9.730  | 0.003378 | 5  | 20.661    |
| 0.4690504E 02  | 0.9197378E 03  | 0.9556218E 03 | 105.971 | 17.662 | 0.043603 | 6  | 24.793    |
| -0.2429331E 03 | 0.2049462E 02  | 0.1252121E 04 | 0.938   | 0.134  | 0.057132 | 7  | 28.926    |
| 0.1251953E 04  | -0.4449121E 03 | 0.1011605E 04 | 333.908 | 41.739 | 0.046157 | 8  | 33.058    |
| 0.4085142E 03  | 0.1162866E 03  | 0.5723694E 03 | 168.278 | 18.698 | 0.026116 | 9  | 37.190    |
| -0.5604371E 03 | -0.2311704E 03 | 0.2442362E 03 | 288.626 | 28.863 | 0.011144 | 10 | 41.322    |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 449 CTR 770 FLT 604.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.3780571E 03 | 0.1766120E 04  | 0.2312990E 04 | 50.553  | 50.553 | 1.000000 | 1  | 4.132     |
| 0.1469992E 04  | -0.2764734E 02 | 0.1353194E 04 | 181.179 | 90.590 | 0.585041 | 2  | 8.264     |
| -0.1352908E 04 | 0.1543039E 03  | 0.2263462E 03 | 137.022 | 45.674 | 0.097859 | 3  | 12.397    |
| -0.1659986E 03 | -0.1433657E 03 | 0.2769255E 03 | 211.178 | 52.795 | 0.119726 | 4  | 16.529    |
| -0.2365265E 03 | -0.1352477E 03 | 0.6739714E 03 | 151.576 | 38.315 | 0.251385 | 5  | 20.661    |
| -0.6002617E 03 | -0.7535164E 03 | 0.8084001E 03 | 291.271 | 48.545 | 0.349591 | 6  | 24.793    |
| 0.2933351E 03  | -0.2654097E 03 | 0.3153699E 03 | 295.177 | 42.168 | 0.136347 | 7  | 28.926    |
| 0.1341623E 03  | 0.7413231E 03  | 0.2908132E 03 | 123.920 | 15.490 | 0.125730 | 8  | 33.058    |
| -0.1622824E 03 | -0.1957338E 02 | 0.1423680E 03 | 187.902 | 20.878 | 0.061552 | 9  | 37.190    |
| -0.1410161E 03 | -0.4103973E 02 | 0.1370323E 03 | 198.109 | 19.811 | 0.057083 | 10 | 41.322    |

# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 20 V= 117.5 KTS n= 1.22 g**

## **BLADE FEATHER ANGLE**

HARMONIC ANALYSIS MODEL AM-50A SHIP 1337 T 469 CTR 940 FLT 604.0 TR 31  
 OVERALL CYCLIC LOAD = 0.494041- 01

| 200 POSITION USED | 3.97           | LOAD/IN USED  | 9.00    |         |          |    |           |  |
|-------------------|----------------|---------------|---------|---------|----------|----|-----------|--|
| AJ                | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |  |
| 0.43613007-01     |                |               |         |         |          |    |           |  |
| 0.43344000-01     | -0.02711187-01 | 0.01711114-01 | 332.213 | 332.213 | 1.000000 | 1  | 4.115     |  |
| 0.44044017-03     | -0.01010233-00 | 0.01515233-03 | 270.156 | 135.774 | 0.033155 | 2  | 8.230     |  |
| -0.25433007-01    | -0.02710475-02 | 0.02733725-01 | 197.043 | 65.681  | 0.006104 | 3  | 12.346    |  |
| 0.33834451-01     | -0.00926333-02 | 0.03030323-01 | 349.703 | 87.444  | 0.037059 | 4  | 16.461    |  |
| -0.10342207-01    | 0.02029517-01  | 0.02231133-01 | 145.524 | 29.105  | 0.004580 | 5  | 20.576    |  |
| -0.20122017-01    | -0.02170227-01 | 0.03574575-01 | 217.771 | 36.295  | 0.007303 | 6  | 24.691    |  |
| -0.10400457-01    | -0.04450307-02 | 0.03303031-01 | 142.665 | 27.520  | 0.004168 | 7  | 28.807    |  |
| -0.17003017-02    | -0.02003013-01 | 0.02977073-01 | 255.529 | 31.991  | 0.006071 | 8  | 32.922    |  |
| -0.20043007-01    | 0.04003004-01  | 0.03421205-01 | 145.010 | 10.112  | 0.007039 | 9  | 37.037    |  |
| -0.04401207-03    | -0.01330117-02 | 0.03237733-02 | 254.166 | 25.417  | 0.000665 | 10 | 41.152    |  |

## **SHAFT MOMENT**

HARMONIC ANALYSIS MODEL AM-50A SHIP 1337 T 469 CTR 940 FLT 604.0 TR 30  
 OVERALL CYCLIC LOAD = 0.692304E 03

|                   |                |               |            |         |          |    |           |  |
|-------------------|----------------|---------------|------------|---------|----------|----|-----------|--|
| 200 POSITION USED | 3.40           | LOAD/IN USED  | -213949.88 |         |          |    |           |  |
| AJ                | BJ             | CJ            | PHIJC      | PSIJC   | CJ/CJMAX | J  | FREQUENCY |  |
| -0.10653007-05    |                |               |            |         |          |    |           |  |
| -0.21655095-05    | 0.05900105-05  | 0.02911945-05 | 110.326    | 110.326 | 1.000000 | 1  | 4.115     |  |
| -0.06405095-05    | 0.04044195-02  | 0.00911945-05 | 172.452    | 86.226  | 0.010174 | 2  | 8.230     |  |
| 0.06403007-04     | -0.02144107-05 | 0.02234235-05 | 266.776    | 95.592  | 0.035422 | 3  | 12.346    |  |
| -0.00342007-03    | -0.07017070-03 | 0.01174105-05 | 270.453    | 55.113  | 0.018661 | 4  | 16.461    |  |
| -0.00051007-04    | 0.02051210-04  | 0.00771305-05 | 150.000    | 31.360  | 0.000580 | 5  | 20.576    |  |
| -0.20170007-03    | -0.01770085-03 | 0.03421075-03 | 324.747    | 54.124  | 0.004899 | 6  | 24.691    |  |
| 0.31241707-04     | -0.02624990-04 | 0.04074925-04 | 319.973    | 45.710  | 0.064844 | 7  | 28.807    |  |
| 0.00427017-02     | 0.01750055-04  | 0.02761005-04 | 67.137     | 10.967  | 0.020795 | 8  | 32.922    |  |
| -0.20778107-04    | 0.01857065-03  | 0.02551135-04 | 168.265    | 19.096  | 0.040546 | 9  | 37.037    |  |
| -0.00733007-03    | 0.03074035-03  | 0.03024105-03 | 144.781    | 14.878  | 0.009429 | 10 | 41.152    |  |

## **PITCH LINK TENSION**

HARMONIC ANALYSIS MODEL AM-50A SHIP 1337 T 469 CTR 940 FLT 604.0 TR 11  
 OVERALL CYCLIC LOAD = 0.455388E 03

| 200 POSITION USED |                | 2.47          | LOAD/IN USED |         | 2181.00  |    |           |  |
|-------------------|----------------|---------------|--------------|---------|----------|----|-----------|--|
| AJ                | BJ             | CJ            | PHIJC        | PSIJC   | CJ/CJMAX | J  | FREQUENCY |  |
| -0.20075007-02    |                |               |              |         |          |    |           |  |
| -0.10308117-03    | -0.11303007-05 | 0.03990355-03 | 229.137      | 229.137 | 0.851006 | 1  | 4.115     |  |
| 0.10303007-03     | -0.00049037-04 | 0.03990355-03 | 133.505      | 169.255 | 0.900511 | 2  | 8.230     |  |
| -0.22000207-02    | -0.10005027-03 | 0.01110035-03 | 269.013      | 87.071  | 1.000000 | 3  | 12.346    |  |
| 0.10311007-03     | -0.05244421-02 | 0.03000007-02 | 273.209      | 67.552  | 0.291466 | 4  | 16.461    |  |
| -0.10070007-02    | -0.01455007-04 | 0.03000007-02 | 259.700      | 51.956  | 0.450259 | 5  | 20.576    |  |
| 0.07400107-01     | -0.02000007-02 | 0.02071007-02 | 241.203      | 40.490  | 0.173001 | 6  | 24.691    |  |
| -0.10440017-02    | 0.01049070-02  | 0.01072007-02 | 31.609       | 7.373   | 0.119472 | 7  | 28.807    |  |
| 0.07201007-01     | 0.04407571-04  | 0.03000007-01 | 0.005        | 0.000   | 0.011502 | 8  | 32.922    |  |
| -0.20080007-02    | -0.02000015-04 | 0.02000007-02 | 221.072      | 25.297  | 0.164464 | 9  | 37.037    |  |
| -0.10080007-02    | -0.02000007-02 | 0.03000007-02 | 221.000      | 22.100  | 0.252062 | 10 | 41.152    |  |

## **FIXED HUB FLAP AT STA 18**

HARMONIC ANALYSIS MODEL AM-50A SHIP 1337 T 469 CTR 940 FLT 604.0 TR 11  
 OVERALL CYCLIC LOAD = 0.157100E 05

| 200 POSITION USED | 5.66           | LOAD/IN USED  | 9999.00 |         |          |    |           |  |
|-------------------|----------------|---------------|---------|---------|----------|----|-----------|--|
| AJ                | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |  |
| -0.07310007-05    |                |               |         |         |          |    |           |  |
| -0.10400007-04    | -0.10400007-05 | 0.01000007-05 | 88.147  | 88.147  | 1.000000 | 1  | 4.115     |  |
| 0.04010007-04     | -0.17000007-04 | 0.03000007-04 | 330.100 | 164.050 | 0.427850 | 2  | 8.230     |  |
| -0.02000007-04    | -0.01000007-04 | 0.03000007-04 | 230.710 | 76.903  | 0.376046 | 3  | 12.346    |  |
| -0.00000007-04    | -0.00000007-04 | 0.03000007-04 | 230.376 | 51.331  | 0.000000 | 4  | 16.461    |  |
| -0.21000007-02    | -0.01000007-03 | 0.03000007-03 | 204.472 | 55.000  | 0.072082 | 5  | 20.576    |  |
| -0.07700007-02    | -0.00000007-03 | 0.03000007-03 | 254.202 | 43.205  | 0.033388 | 6  | 24.691    |  |
| -0.10070007-03    | 0.02000007-03  | 0.03000007-03 | 44.355  | 7.051   | 0.027058 | 7  | 28.807    |  |
| 0.03000007-03     | 0.04000007-03  | 0.02000007-03 | 55.509  | 6.423   | 0.040392 | 8  | 32.922    |  |
| -0.00000007-04    | 0.01000007-02  | 0.03000007-02 | 95.212  | 10.357  | 0.000270 | 9  | 37.037    |  |
| -0.10070007-03    | 0.01000007-03  | 0.02000007-03 | 150.354 | 15.354  | 0.020093 | 10 | 41.152    |  |



# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 20 V= 117.5 KTS n= 1.22 g**

## **FIXED HUB CHORD AT STA 18**

HARMONIC ANALYSIS MODEL AM-50A SHIP 1000 T 409 CTR 940 FLT 604.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.4577704E 05  |                | 0.1771771E 05 | 62.843  | 62.843 | 1.000000 | 1  | 4.115     |
| 0.4577704E 05  | 0.7803673E 05  | 0.3111377E 05 | 52.205  | 28.132 | 0.042508 | 2  | 8.230     |
| 0.4577704E 05  | 0.6416377E 04  | 0.1333471E 05 | 232.987 | 95.321 | 0.114756 | 3  | 12.346    |
| 0.277114E 04   | -0.4675707E 04 | 0.1170372E 05 | 132.443 | 42.030 | 0.013542 | 4  | 16.461    |
| -0.117341E 04  | -0.9211143E 02 | 0.9203074E 05 | 200.838 | 41.303 | 0.010901 | 5  | 20.576    |
| -0.6530667E 03 | -0.421534E 03  | 0.7337355E 05 | 236.845 | 39.441 | 0.010681 | 6  | 24.691    |
| -0.5150603E 03 | -0.7324807E 03 | 0.1331135E 05 | 182.284 | 28.041 | 0.015153 | 7  | 28.807    |
| -0.1503032E 04 | -0.0343145E 02 | 0.1330000E 05 | 76.109  | 7.914  | 0.012022 | 8  | 32.922    |
| 0.251137E 03   | 0.1623610E 04  | 0.1330000E 05 | 217.445 | 24.166 | 0.005248 | 9  | 37.037    |
| -0.355154E 03  | -0.2801765E 03 | 0.2374315E 05 | 73.365  | 7.337  | 0.002707 | 10 | 41.152    |

## **BLADE FLAP AT STA 174**

HARMONIC ANALYSIS MODEL AM-50A SHIP 1000 T 409 CTR 940 FLT 604.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2244211E 04  |                | 0.1411170E 04 | 319.164 | 319.164 | 1.000000 | 1  | 4.115     |
| 0.3693000E 04  | -0.3141800E 04 | 0.3334373E 04 | 173.807 | 86.703  | 0.015004 | 2  | 8.230     |
| -0.2357135E 04 | 0.3241633E 03  | 0.1411000E 04 | 60.961  | 28.954  | 0.005173 | 3  | 12.346    |
| 0.815671E 02   | 0.1431368E 04  | 0.3234373E 04 | 211.241 | 22.310  | 0.066726 | 4  | 16.461    |
| -0.2754700E 03 | -0.1684221E 03 | 0.3337355E 05 | 204.976 | 40.945  | 0.063072 | 5  | 20.576    |
| -0.2754700E 03 | -0.1684221E 03 | 0.3337355E 05 | 204.976 | 40.945  | 0.063072 | 5  | 20.576    |
| -0.1550603E 03 | -0.7324807E 03 | 0.1330000E 05 | 76.109  | 7.914   | 0.012022 | 8  | 32.922    |
| 0.251137E 03   | 0.1623610E 04  | 0.1330000E 05 | 217.445 | 24.166  | 0.005248 | 9  | 37.037    |
| -0.355154E 03  | -0.2801765E 03 | 0.2374315E 05 | 73.365  | 7.337   | 0.002707 | 10 | 41.152    |

## **BLADE CHORD AT STA 174**

HARMONIC ANALYSIS MODEL AM-50A SHIP 1000 T 409 CTR 940 FLT 604.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2452928E 04  |                | 0.2078170E 05 | 74.967  | 74.967 | 1.000000 | 1  | 4.115     |
| 0.5390000E 04  | 0.7007043E 05  | 0.3940783E 04 | 56.341  | 28.170 | 0.189628 | 2  | 8.230     |
| 0.2184124E 04  | 0.3280108E 04  | 0.5033011E 04 | 274.446 | 91.432 | 0.242199 | 3  | 12.346    |
| 0.3901960E 03  | -0.5016156E 04 | 0.2019183E 04 | 45.181  | 16.295 | 0.097147 | 4  | 16.461    |
| 0.0674453E 03  | 0.1832410E 04  | 0.2019183E 04 | 224.965 | 44.993 | 0.013721 | 5  | 20.576    |
| -0.2017570E 03 | -0.2019112E 03 | 0.8945742E 03 | 171.246 | 78.541 | 0.033422 | 6  | 24.691    |
| -0.5564641E 03 | 0.1057085E 03  | 0.0642268E 03 | 342.386 | 46.912 | 0.030904 | 7  | 28.807    |
| 0.6117587E 03  | -0.1942467E 03 | 0.4444363E 03 | 4.164   | 0.523  | 0.047852 | 8  | 32.922    |
| 0.5445616E 02  | 0.7256189E 02  | 0.5095673E 03 | 83.752  | 9.306  | 0.024520 | 9  | 37.037    |
| 0.1382741E 03  | -0.4412404E 02 | 0.1464608E 03 | 340.810 | 34.081 | 0.007045 | 10 | 41.152    |

## **BLADE TORSION AT STA 131.5**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1000 T 469 CTR 940 FLT 604.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.4737276E 03 |                | 0.2153131E 04 | 44.893  | 44.893 | 1.000000 | 1  | 4.115     |
| 0.1525423E 04  | 0.1519659E 04  | 0.1246641E 04 | 165.825 | 82.913 | 0.578990 | 2  | 8.230     |
| -0.1206665E 04 | 0.3052808E 03  | 0.3736455E 03 | 92.616  | 30.872 | 0.173536 | 3  | 12.346    |
| -0.1705641E 02 | 0.3736455E 03  | 0.3425977E 03 | 179.971 | 44.893 | 0.159116 | 4  | 16.461    |
| -0.3425977E 03 | 0.1753094E 00  | 0.7534250E 03 | 134.592 | 26.918 | 0.344921 | 5  | 20.576    |
| -0.2294414E 03 | 0.5325354E 03  | 0.7456216E 03 | 255.908 | 42.851 | 0.346294 | 6  | 24.691    |
| -0.1814424E 03 | -0.7231831E 03 | 0.1353603E 03 | 262.951 | 37.464 | 0.062867 | 7  | 28.807    |
| -0.1814424E 03 | -0.1343373E 03 | 0.5215300E 03 | 65.167  | 8.146  | 0.242219 | 8  | 32.922    |
| 0.7190264E 02  | 0.4733006E 03  | 0.2362740E 03 | 119.392 | 13.266 | 0.105735 | 9  | 37.037    |
| -0.1159598E 03 | 0.2058609E 03  | 0.1676547E 03 | 138.311 | 13.831 | 0.077401 | 10 | 41.152    |

# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 21 V= 119.5 KTS n= 1.43 g**

## **BLADE FEATHER ANGLE**

HARMONIC ANALYSIS MODEL AH-56A SHIP 1005 T 469 CTR 779 FLT 604.0 TP 31

| UJ             | PJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.01554855 C1  |                |               |         |         |          | 1  | 4.132     |
| 0.66571275 C1  | -0.21842315 C1 | 0.51430885 C1 | 334.873 | 334.873 | 1.000000 | 1  | 4.132     |
| -0.11000315 C1 | -0.12578135 C1 | 0.12655445 C1 | 261.446 | 130.999 | 0.024689 | 2  | 8.264     |
| -0.11407075 C1 | -0.27570465 C2 | 0.31528795 C1 | 125.005 | 61.670  | 0.006125 | 3  | 12.397    |
| -0.27776465 C1 | 0.10918615 C1  | 0.20644285 C1 | 140.015 | 35.005  | 0.005956 | 4  | 16.529    |
| -0.02551145 C1 | -0.02232545 C2 | 0.07751655 C1 | 263.548 | 52.710  | 0.001605 | 5  | 20.661    |
| -0.04551455 C1 | -0.08550045 C2 | 0.12750625 C1 | 221.553 | 31.999  | 0.000259 | 6  | 24.793    |
| 0.16070005 C1  | 0.45955665 C2  | 0.16677715 C1 | 16.011  | 2.287   | 0.033242 | 7  | 28.926    |
| 0.35368465 C2  | 0.12875345 C1  | 0.14365415 C1 | 65.363  | 8.170   | 0.002755 | 8  | 33.058    |
| 0.75057465 C2  | 0.64481505 C2  | 0.09582275 C2 | 40.651  | 4.517   | 0.001924 | 9  | 37.190    |
| 0.23814045 C2  | 0.40654735 C2  | 0.47115585 C2 | 55.840  | 5.964   | 0.030916 | 10 | 41.322    |

## **SHAFT MOMENT**

HARMONIC ANALYSIS MODEL AH-56A SHIP 1005 T 469 CTR 779 FLT 604.0 TP 36

| UJ             | PJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| 0.11678445 U5  |                |               |         |         |           | 1  | 4.132     |
| -0.37816515 U5 | 0.66710305 U5  | 0.74350035 U5 | 120.302 | 120.302 | 1.000000  | 1  | 4.132     |
| -0.37661175 U5 | -0.15187675 U5 | 0.23061145 U5 | 244.229 | 124.115 | 0.027567  | 2  | 8.264     |
| -0.37451175 U5 | -0.22830475 U5 | 0.23355415 U5 | 251.861 | 83.954  | 0.0320959 | 3  | 12.397    |
| -0.37356455 U5 | 0.15378025 U5  | 0.15014035 U5 | 119.783 | 29.946  | 0.020566  | 4  | 16.529    |
| -0.37391665 U5 | 0.45514775 U5  | 0.3257025 U5  | 137.469 | 27.444  | 0.097729  | 5  | 20.661    |
| -0.37064745 U5 | -0.11544935 U5 | 0.11925335 U5 | 300.487 | 50.081  | 0.018579  | 6  | 24.793    |
| -0.36978595 U5 | -0.38550775 U5 | 0.36978025 U5 | 264.974 | 38.425  | 0.052029  | 7  | 28.926    |
| 0.68894135 U5  | 0.01359315 U5  | 0.32657315 U5 | 42.741  | 5.240   | 0.012363  | 8  | 33.058    |
| 0.42144425 U5  | 0.15694455 U5  | 0.23140325 U5 | 77.921  | 8.658   | 0.026872  | 9  | 37.190    |
| 0.73425445 U5  | 0.62426205 U5  | 0.35760325 U5 | 40.178  | 4.018   | 0.012910  | 10 | 41.322    |

## **PITCH LINK TENSION**

HARMONIC ANALYSIS MODEL AH-56A SHIP 1005 T 469 CTR 779 FLT 604.0

| UJ             | PJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.25431175 C1 |                |               |         |         |          | 1  | 4.132     |
| -0.14715245 C1 | -0.23114305 C1 | 0.27189475 C1 | 239.231 | 239.231 | 1.000000 | 1  | 4.132     |
| 0.13245745 C1  | -0.12533445 C1 | 0.21323545 C1 | 324.335 | 162.332 | 0.784135 | 2  | 8.264     |
| -0.37572445 C2 | -0.16732505 C1 | 0.17649255 C1 | 250.880 | 87.627  | 0.650950 | 3  | 12.397    |
| 0.37176465 C1  | -0.35527745 C1 | 0.46558745 C1 | 204.876 | 74.959  | 0.015063 | 4  | 16.529    |
| -0.61555005 C2 | -0.35617535 C2 | 0.77613575 C2 | 212.627 | 42.525  | 0.273728 | 5  | 20.661    |
| -0.25511475 C2 | -0.11924715 C2 | 0.30666295 C2 | 202.525 | 33.754  | 0.117521 | 6  | 24.793    |
| 0.17005575 C2  | 0.11100355 C2  | 0.15424425 C2 | 41.026  | 6.575   | 0.056779 | 7  | 28.926    |
| -0.25733155 C2 | -0.30507205 C2 | 0.34705365 C2 | 233.044 | 28.868  | 0.146361 | 8  | 33.058    |
| -0.21727555 C2 | -0.11911645 C2 | 0.30681965 C2 | 147.216 | 17.468  | 0.112847 | 9  | 37.190    |
| -0.36456165 C2 | -0.84461775 C1 | 0.37421785 C2 | 143.044 | 15.304  | 0.137631 | 10 | 41.322    |

## **FIXED INBOARD FLAP AT STA 18**

HARMONIC ANALYSIS MODEL AH-56A SHIP 1005 T 469 CTR 779 FLT 604.0 TP 1

| UJ             | PJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.05712275 J4  |                |               |         |         |          | 1  | 4.132     |
| -0.35712275 C4 | 0.55375065 C4  | 0.10540775 C5 | 114.937 | 114.937 | 1.000000 | 1  | 4.132     |
| 0.46005125 C4  | -0.27448675 C4 | 0.53497815 C4 | 334.004 | 167.002 | 0.488084 | 2  | 8.264     |
| -0.28779905 C4 | -0.28264535 J4 | 0.43318155 J4 | 224.483 | 74.828  | 0.368373 | 3  | 12.397    |
| -0.05122575 C4 | -0.10117545 C4 | 0.17501855 C4 | 227.824 | 56.706  | 0.125833 | 4  | 16.529    |
| -0.15545005 C2 | -0.62768925 C7 | 0.62768165 C3 | 264.581 | 53.716  | 0.057284 | 5  | 20.661    |
| 0.33642575 C3  | -0.47983295 J3 | 0.58775135 J3 | 335.275 | 53.879  | 0.353623 | 6  | 24.793    |
| 0.75524735 C3  | 0.46074055 C3  | 0.05655115 C3 | 37.587  | 4.798   | 0.077238 | 7  | 28.926    |
| 0.25574295 C3  | 0.67886185 C3  | 0.77649335 C3 | 60.330  | 8.541   | 0.056646 | 8  | 33.058    |
| 0.33050145 C3  | 0.38055495 C3  | 0.53716515 J3 | 40.332  | 5.148   | 0.349338 | 9  | 37.190    |
| 0.33233785 C1  | -0.35345775 C2 | 0.35541845 C2 | 275.409 | 27.541  | 0.007608 | 10 | 41.322    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 21 V= 119.5 KTS n= 1.43 g

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 779 FLT 604.0 TR 3

| AJ            | BJ            | CJ            | PHJC   | PSJC   | CJ/CJMAX  | J  | FREQUENCY |
|---------------|---------------|---------------|--------|--------|-----------|----|-----------|
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 57.176 | 57.176 | 1.0000000 | 1  | 4.132     |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 57.176 | 57.176 | 1.0000000 | 2  | 8.264     |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 57.176 | 57.176 | 1.0000000 | 3  | 12.397    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 57.176 | 57.176 | 1.0000000 | 4  | 16.529    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 57.176 | 57.176 | 1.0000000 | 5  | 20.661    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 57.176 | 57.176 | 1.0000000 | 6  | 24.793    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 57.176 | 57.176 | 1.0000000 | 7  | 28.926    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 57.176 | 57.176 | 1.0000000 | 8  | 33.058    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 57.176 | 57.176 | 1.0000000 | 9  | 37.190    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 57.176 | 57.176 | 1.0000000 | 10 | 41.322    |

BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 779 FLT 604.0 TR 50

| AJ            | BJ            | CJ            | PHJC    | PSJC    | CJ/CJMAX  | J  | FREQUENCY |
|---------------|---------------|---------------|---------|---------|-----------|----|-----------|
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 315.241 | 315.241 | 1.0000000 | 1  | 4.132     |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 315.241 | 315.241 | 1.0000000 | 2  | 8.264     |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 315.241 | 315.241 | 1.0000000 | 3  | 12.397    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 315.241 | 315.241 | 1.0000000 | 4  | 16.529    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 315.241 | 315.241 | 1.0000000 | 5  | 20.661    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 315.241 | 315.241 | 1.0000000 | 6  | 24.793    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 315.241 | 315.241 | 1.0000000 | 7  | 28.926    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 315.241 | 315.241 | 1.0000000 | 8  | 33.058    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 315.241 | 315.241 | 1.0000000 | 9  | 37.190    |
| 0.00000000 04 | 0.00000000 05 | 0.00000000 06 | 315.241 | 315.241 | 1.0000000 | 10 | 41.322    |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 779 FLT 604.0 TR 42

| AJ            | BJ            | CJ            | PHJC   | PSJC   | CJ/CJMAX  | J  | FREQUENCY |
|---------------|---------------|---------------|--------|--------|-----------|----|-----------|
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 61.045 | 61.045 | 1.0000000 | 1  | 4.132     |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 61.045 | 61.045 | 1.0000000 | 2  | 8.264     |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 61.045 | 61.045 | 1.0000000 | 3  | 12.397    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 61.045 | 61.045 | 1.0000000 | 4  | 16.529    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 61.045 | 61.045 | 1.0000000 | 5  | 20.661    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 61.045 | 61.045 | 1.0000000 | 6  | 24.793    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 61.045 | 61.045 | 1.0000000 | 7  | 28.926    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 61.045 | 61.045 | 1.0000000 | 8  | 33.058    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 61.045 | 61.045 | 1.0000000 | 9  | 37.190    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 61.045 | 61.045 | 1.0000000 | 10 | 41.322    |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 779 FLT 604.0 TR 44

| AJ            | BJ            | CJ            | PHJC   | PSJC   | CJ/CJMAX  | J  | FREQUENCY |
|---------------|---------------|---------------|--------|--------|-----------|----|-----------|
| 0.00000000 02 | 0.00000000 04 | 0.00000000 04 | 52.661 | 52.661 | 1.0000000 | 1  | 4.132     |
| 0.00000000 02 | 0.00000000 04 | 0.00000000 04 | 52.661 | 52.661 | 1.0000000 | 2  | 8.264     |
| 0.00000000 02 | 0.00000000 04 | 0.00000000 04 | 52.661 | 52.661 | 1.0000000 | 3  | 12.397    |
| 0.00000000 02 | 0.00000000 04 | 0.00000000 04 | 52.661 | 52.661 | 1.0000000 | 4  | 16.529    |
| 0.00000000 02 | 0.00000000 04 | 0.00000000 04 | 52.661 | 52.661 | 1.0000000 | 5  | 20.661    |
| 0.00000000 02 | 0.00000000 04 | 0.00000000 04 | 52.661 | 52.661 | 1.0000000 | 6  | 24.793    |
| 0.00000000 02 | 0.00000000 04 | 0.00000000 04 | 52.661 | 52.661 | 1.0000000 | 7  | 28.926    |
| 0.00000000 02 | 0.00000000 04 | 0.00000000 04 | 52.661 | 52.661 | 1.0000000 | 8  | 33.058    |
| 0.00000000 02 | 0.00000000 04 | 0.00000000 04 | 52.661 | 52.661 | 1.0000000 | 9  | 37.190    |
| 0.00000000 02 | 0.00000000 04 | 0.00000000 04 | 52.661 | 52.661 | 1.0000000 | 10 | 41.322    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 22 V= 120.5 KTS n= 1.45 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 948 FLT 604.0 TP 31

| FJ             | FJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| C.0502914F-01  | -0.2424552F-01 | 0.5028771E-01 | 331.145 | 331.145 | 1.000000 | 1  | 4.149     |
| C.0404588F-01  | -0.1574564F-01 | 0.1623233E-01 | 256.365 | 128.184 | 0.332215 | 2  | 8.299     |
| -C.0411227F-01 | -0.0345222F-01 | 0.5438150F-01 | 240.027 | 80.009  | 0.019166 | 3  | 12.448    |
| -C.0451100F-01 | -0.7450774F-02 | 0.2113365F-01 | 201.076 | 50.269  | 0.074401 | 4  | 16.593    |
| -C.0304155F-01 | -0.4744634F-02 | 0.5475649F-02 | 230.326 | 47.635  | 0.131385 | 5  | 20.747    |
| -C.0278054F-02 | -0.2125367F-01 | 0.2146168F-01 | 262.700 | 41.783  | 0.004269 | 6  | 24.896    |
| -C.0273385F-02 | -0.1844626F-01 | 0.1559172F-01 | 262.245 | 37.464  | 0.003101 | 7  | 29.046    |
| -C.0210293F-02 | 0.3005743F-01  | 0.3113740F-01 | 75.153  | 9.394   | 0.136152 | 8  | 33.195    |
| C.0504147F-02  | 0.7451165F-02  | 0.1228333F-01 | 37.745  | 4.149   | 0.002443 | 9  | 37.344    |
| C.0504147F-02  | -0.6227507F-02 | 0.0542364F-02 | 313.267 | 31.327  | 0.001701 | 10 | 41.454    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 948 FLT 604.0 TR 36

| FJ             | FJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.7006522F-04 | 0.6754688F-05  | 0.7621144E-05 | 116.901 | 116.901 | 1.000000 | 1  | 4.145     |
| -0.3448772F-05 | -0.8555732F-02 | 0.5934734E-05 | 188.820 | 94.410  | 0.007702 | 2  | 8.299     |
| -0.5000000F-05 | -0.2600159F-05 | 0.2716516E-05 | 233.163 | 84.388  | 0.350456 | 3  | 12.448    |
| -0.8451267F-05 | -0.2121196F-04 | 0.2291355F-05 | 249.277 | 62.369  | 0.029361 | 4  | 16.598    |
| -0.4070591F-04 | 0.3526157E-04  | 0.6258400E-05 | 141.198 | 28.238  | 0.002119 | 5  | 20.747    |
| 0.2906216F-02  | 0.9757440F-03  | 0.3761324E-05 | 88.293  | 14.715  | 0.012809 | 6  | 24.896    |
| -0.6672740F-03 | -0.3402832F-04 | 0.4014617E-05 | 260.442 | 37.236  | 0.052730 | 7  | 29.046    |
| -0.7032611F-03 | -0.2345135E-05 | 0.7412767E-05 | 192.443 | 24.305  | 0.009727 | 8  | 33.195    |
| 0.1154731F-03  | 0.1450602F-04  | 0.1461325E-05 | 85.467  | 9.690   | 0.019176 | 9  | 37.344    |
| -0.1542314F-03 | 0.1201913E-04  | 0.1215951E-05 | 93.715  | 9.871   | 0.015955 | 10 | 41.454    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 948 FLT 604.0 TP 11

| FJ             | FJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -C.1244221F-03 | -0.1841765F-03 | 0.2087481E-03 | 241.920 | 241.920 | 0.834070 | 1  | 4.149     |
| -C.0922351F-02 | -0.1841595F-02 | 0.1682525E-03 | 327.865 | 163.934 | 0.672011 | 2  | 8.299     |
| C.1424521F-03  | -0.2145102F-03 | 0.2500366F-03 | 239.227 | 75.754  | 1.000000 | 3  | 12.448    |
| -C.1277665F-03 | -0.6450816F-02 | 0.7238576F-02 | 247.561 | 61.890  | 0.289515 | 4  | 16.593    |
| -C.0504053F-02 | -0.5764729F-02 | 0.1559650E-03 | 242.621 | 48.524  | 0.439756 | 5  | 20.747    |
| -C.0297431F-01 | -0.3554563F-02 | 0.3129039E-02 | 245.377 | 47.563  | 0.149140 | 6  | 24.896    |
| C.0107061F-02  | 0.5157031F-01  | 0.7224522F-02 | 9.196   | 1.314   | 0.128962 | 7  | 29.046    |
| -C.1204226F-02 | -0.3120052F-02 | 0.3146350F-02 | 248.808 | 31.131  | 0.133834 | 8  | 33.195    |
| -C.1418276F-02 | -0.6717820F-02 | 0.3477452E-02 | 181.123 | 30.125  | 0.137480 | 9  | 37.344    |
| -C.0454437F-02 | -0.1436562F-02 | 0.2044469E-02 | 210.343 | 21.034  | 0.113762 | 10 | 41.454    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 948 FLT 604.0 TP 1

| FJ             | FJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| C.0170777F-04  | 0.1200460F-05  | 0.1773756E-05 | 109.531 | 109.531 | 1.000000 | 1  | 4.149     |
| -C.0425277F-04 | -0.1431652F-04 | 0.5729035E-04 | 745.455 | 172.729 | 0.449835 | 2  | 8.299     |
| C.0446150F-04  | -0.3727916F-04 | 0.5118941E-04 | 274.712 | 75.571  | 0.431956 | 3  | 12.448    |
| -C.0316542F-04 | -0.1182731F-04 | 0.2404647E-04 | 277.740 | 59.335  | 0.110292 | 4  | 16.598    |
| -C.0410290F-03 | -0.6061455F-03 | 0.7454475F-03 | 234.083 | 46.817  | 0.058838 | 5  | 20.747    |
| C.0111957F-03  | -0.0772440F-03 | 0.8103091F-03 | 270.793 | 44.632  | 0.369856 | 6  | 24.896    |
| C.0111305F-03  | 0.4884031F-02  | 0.1150576F-03 | 4.536   | 0.648   | 0.048287 | 7  | 29.046    |
| C.0315111F-03  | 0.4504000F-03  | 0.5044002F-03 | 55.004  | 6.951   | 0.064667 | 8  | 33.195    |
| -C.0115737F-03 | 0.6557285F-03  | 0.6557285F-03 | 85.474  | 5.964   | 0.151755 | 9  | 37.344    |
| -C.0116833F-03 | 0.2852175F-03  | 0.4005110E-03 | 105.771 | 10.577  | 0.023594 | 10 | 41.454    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 22 V= 120.5 KTS n= 1.45 g

FIXED INUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 948 FLT 604.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|-----------|----|-----------|
| 0.5422834E 05  | 0.7567271E 05  | 0.9705298E 05 | 54.412  | 54.412 | 1.0000000 | 1  | 4.149     |
| 0.5417251E 05  | 0.4051355E 04  | 0.9521241E 04 | 25.210  | 12.635 | 0.102321  | 2  | 8.299     |
| 0.0714441E 04  | -0.1237273E 05 | 0.1265703E 05 | 281.662 | 53.987 | 0.175986  | 3  | 12.448    |
| 0.2557941E 04  | 0.5707011E 04  | 0.4755176E 03 | 95.649  | 23.512 | 0.010403  | 4  | 16.598    |
| -0.0401215E 02 | -0.1067276E 04 | 0.1067292E 04 | 271.648 | 54.349 | 0.011476  | 5  | 20.747    |
| 0.3674079E 02  | -0.3659457E 04 | 0.3543415E 04 | 211.631 | 43.605 | 0.042346  | 6  | 24.896    |
| -0.5135337E 03 | -0.1491733E 04 | 0.7497826E 04 | 216.671 | 30.953 | 0.026843  | 7  | 29.046    |
| -0.7007467E 04 | 0.4256020E 03  | 0.1144297E 04 | 157.038 | 15.747 | 0.012297  | 8  | 33.195    |
| -0.3547612E 03 | -0.8127845E 02 | 0.3688389E 03 | 192.121 | 21.415 | 0.003963  | 9  | 37.344    |
| -0.7144807E 03 | 0.5748555E 03  | 0.4170542E 03 | 141.179 | 14.118 | 0.009855  | 10 | 41.494    |

BLADE FLAP AT STA 176

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 948 FLT 604.0 TR 53

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| 0.2551674E 04  | -0.3754516E 04 | 0.4017645E 04 | 311.501 | 311.501 | 1.0000000 | 1  | 4.149     |
| 0.3322211E 04  | 0.1758976E 04  | 0.3481924E 04 | 149.716 | 74.858  | 0.494882  | 2  | 8.299     |
| -0.0103537E 04 | 0.1140716E 04  | 0.1460229E 04 | 51.250  | 17.117  | 0.291331  | 3  | 12.448    |
| 0.0127524E 03  | -0.7242205E 03 | 0.7571117E 03 | 172.847 | 49.212  | 0.064965  | 4  | 16.598    |
| -0.3175581E 03 | 0.1625212E 03  | 0.5567439E 03 | 162.215 | 32.463  | 0.113647  | 5  | 20.747    |
| -0.7785276E 03 | -0.4475492E 03 | 0.5675162E 03 | 211.711 | 38.618  | 0.117415  | 6  | 24.896    |
| -0.0250511E 03 | -0.2515850E 03 | 0.7055040E 03 | 242.346 | 76.057  | 0.061015  | 7  | 29.046    |
| 0.0670114E 03  | -0.2427123E 03 | 0.6177353E 03 | 336.895 | 42.112  | 0.123363  | 8  | 33.195    |
| 0.0243400E 03  | -0.7777371E 03 | 0.7325042E 03 | 247.155 | 38.578  | 0.066120  | 9  | 37.344    |
| 0.2459754E 03  | -0.1652032E 03 | 0.3151531E 03 | 227.520 | 32.753  | 0.062855  | 10 | 41.494    |

BLADE CHORD AT STA 176

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 948 FLT 604.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|-----------|----|-----------|
| 0.2853894E 05  | 0.1691116E 05  | 0.2127692E 05 | 52.638  | 52.638 | 1.0000000 | 1  | 4.149     |
| 0.1291201E 05  | 0.3241780E 03  | 0.4236961E 04 | 4.388   | 2.194  | 0.199134  | 2  | 8.299     |
| 0.4224542E 04  | -0.5305488E 04 | 0.6389468E 04 | 236.455 | 78.818 | 0.300310  | 3  | 12.448    |
| -0.3430872E 04 | 0.1662386E 03  | 0.1920368E 04 | 4.966   | 1.242  | 0.050256  | 4  | 16.598    |
| 0.1913100E 04  | 0.1113444E 04  | 0.1495031E 04 | 131.297 | 26.279 | 0.069795  | 5  | 20.747    |
| -0.0920051E 03 | 0.5306962E 03  | 0.6140967E 03 | 59.783  | 9.964  | 0.028862  | 6  | 24.896    |
| 0.3040410E 03  | -0.7820320E 03 | 0.6436919E 03 | 292.041 | 41.720 | 0.034653  | 7  | 29.046    |
| 0.3160074E 03  | -0.6031479E 03 | 0.1011084E 04 | 216.330 | 27.041 | 0.047849  | 8  | 33.195    |
| -0.0201810E 03 | 0.8025176E 03  | 0.1119447E 04 | 45.797  | 5.089  | 0.052614  | 9  | 37.344    |
| 0.7004944E 03  | -0.4080650E 01 | 0.4374893E 03 | 180.535 | 18.054 | 0.020562  | 10 | 41.494    |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AH-56A SHIP 1009 T 469 CTR 948 FLT 604.0 TR 46

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|-----------|----|-----------|
| -0.5236523E 03 | 0.1605283E 04  | 0.2433023E 04 | 41.284  | 41.284 | 1.0000000 | 1  | 4.149     |
| 0.1828297E 04  | 0.5031152E 03  | 0.1196759E 04 | 154.080 | 77.040 | 0.491881  | 2  | 8.299     |
| -0.1076375E 04 | 0.3138403E 03  | 0.4468267E 03 | 42.244  | 14.081 | 0.191871  | 3  | 12.448    |
| 0.3455874E 03  | 0.6747236E 02  | 0.2899199E 03 | 166.502 | 41.625 | 0.119160  | 4  | 16.598    |
| -0.2491911E 03 | 0.8146656E 03  | 0.8946002E 03 | 113.692 | 22.738 | 0.367800  | 5  | 20.747    |
| -0.3595620E 03 | -0.3456445E 03 | 0.8029587E 03 | 205.497 | 34.249 | 0.320025  | 6  | 24.896    |
| -0.7247546E 03 | -0.1061852E 03 | 0.2135234E 03 | 209.760 | 29.966 | 0.087925  | 7  | 29.046    |
| -0.1857043E 03 | 0.3833580E 02  | 0.6140779E 03 | 3.579   | 0.447  | 0.252393  | 8  | 33.195    |
| 0.0128001E 03  | 0.0067349E 02  | 0.3036394E 03 | 11.526  | 1.281  | 0.124799  | 9  | 37.344    |
| 0.2974149E 03  | 0.1567556E 03  | 0.2181731E 03 | 46.690  | 4.665  | 0.089672  | 10 | 41.494    |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 23 V= 122.5 KTS n= 1.66 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 469 CTR 789 FLT 604.0 TR 31

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| C.4950029E C1  |                |               |         |         |          |    |           |
| J.1772740E C1  | -J.2502220E C1 | 0.5076311E 01 | 330.209 | 330.209 | 1.000000 | 1  | 4.167     |
| -C.1072451E C1 | -0.1267815E-01 | 0.1267405E 00 | 215.127 | 107.564 | 0.025066 | 2  | 8.333     |
| -C.1801985E-01 | 0.5447111E-01  | 0.1076167E 00 | 158.155 | 49.385  | 0.023574 | 3  | 12.500    |
| -C.0757494E-01 | 0.5750842E-02  | 0.0415711E-01 | 176.474 | 44.118  | 0.018695 | 4  | 16.667    |
| -C.4674759E-01 | 0.1075072E-01  | 0.5173174E-01 | 154.223 | 31.845  | 0.010272 | 5  | 20.833    |
| -C.3230959E-01 | -0.1015104E-01 | 0.3455232E-01 | 197.348 | 32.900  | 0.006742 | 6  | 25.000    |
| -C.4401812E-02 | -0.1547284E-04 | 0.4405849E-02 | 140.239 | 25.748  | 0.011930 | 7  | 29.167    |
| C.3174374E-01  | 0.2847710E-02  | 0.5707554E-01 | 3.193   | 0.399   | 0.010331 | 8  | 33.333    |
| -C.1217427E-01 | -0.1153575E-02 | 0.1223167E-01 | 195.553 | 20.617  | 0.002425 | 9  | 37.500    |
| -C.3103473E-01 | 0.1447744E-02  | 0.3077432E-01 | 177.707 | 17.770  | 0.007163 | 10 | 41.667    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 469 CTR 789 FLT 604.0 TR 36

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -J.1001009E 05 |                |               |         |         |          |    |           |
| -J.0346453E 05 | 0.5171611E 05  | 0.0222513E 05 | 141.046 | 141.046 | 1.000000 | 1  | 4.167     |
| -J.2643895E 04 | -0.4015000E 04 | 0.4727243E 04 | 238.161 | 119.081 | 0.057470 | 2  | 8.333     |
| -J.5205357E 04 | -0.4047805E 05 | 0.4041107E 05 | 207.672 | 87.557  | 0.496157 | 3  | 12.500    |
| -J.1701327E 04 | -J.2718361E 04 | 0.3340536E 05 | 237.531 | 59.383  | 0.040611 | 4  | 16.667    |
| -J.1104391E 04 | 0.1015403E 04  | 0.1120474E 05 | 170.161 | 34.032  | 0.136767 | 5  | 20.833    |
| J.1916059E 04  | 0.0006951E 04  | 0.2414305E 04 | 47.163  | 7.860   | 0.034260 | 6  | 25.000    |
| J.3782190E 04  | -0.8656121E 04 | 0.7655595E 04 | 299.607 | 42.801  | 0.093071 | 7  | 29.167    |
| -J.2022499E 04 | 0.2678716E 05  | 0.2062173E 04 | 171.879 | 21.487  | 0.024836 | 8  | 33.333    |
| -J.2903011E 04 | J.3310913E 04  | 0.4149773E 04 | 127.801 | 14.200  | 0.050436 | 9  | 37.500    |
| -J.4130459E 03 | 0.2003542E 04  | 0.2124349E 04 | 101.213 | 10.121  | 0.025823 | 10 | 41.667    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 469 CTR 789 FLT 604.0 TR 11

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -C.1300069E C1 |                |               |         |         |          |    |           |
| C.1272563E C2  | -J.2502220E C1 | J.2572208E C3 | 276.258 | 276.258 | 1.000000 | 1  | 4.167     |
| C.1272563E C1  | -J.2502220E C1 | 0.1535401E 03 | 326.242 | 163.121 | 0.527591 | 2  | 8.333     |
| -C.1500768E C1 | -0.1853764E C3 | 0.2784255E C3 | 273.075 | 74.358  | 0.913584 | 3  | 12.500    |
| -C.1500768E C1 | 0.1853764E C3  | 0.2784255E C3 | 177.333 | 44.325  | 0.137666 | 4  | 16.667    |
| -C.2375937E C2 | -0.6477600E C2 | 0.6684703E C2 | 250.255 | 50.051  | 0.234316 | 5  | 20.833    |
| C.9514400E C2  | -0.4072129E C2 | 0.1070759E C3 | 277.875 | 56.313  | 0.364426 | 6  | 25.000    |
| C.5084125E C2  | -0.2523253E C2 | J.5875847E C2 | 233.835 | 47.658  | 0.193174 | 7  | 29.167    |
| -C.1787355E C2 | 0.1391298E C3  | 0.1645235E C2 | 157.568 | 19.696  | 0.124540 | 8  | 33.333    |
| -C.5470404E C2 | -0.1357021E C2 | 0.6439736E C2 | 211.740 | 23.538  | 0.211159 | 9  | 37.500    |
| -C.2522950E C2 | 0.1300178E C2  | J.3732786E C2 | 155.877 | 15.587  | 0.139135 | 10 | 41.667    |

## FIXED INR FLAP AT STA 38

HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 469 CTR 789 FLT 604.0 TR 1

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| C.1671301E C5  |                |               |         |         |          |    |           |
| -C.0350688E C4 | J.0227260E C4  | 0.1175803E 05 | 135.290 | 135.290 | 1.000000 | 1  | 4.167     |
| C.4531719E C4  | -0.1594467E C4 | J.5758339E C4 | 347.883 | 171.941 | 0.489678 | 2  | 8.333     |
| -C.4531719E C4 | -0.3085407E C4 | 0.5144008E C4 | 211.868 | 70.623  | 0.496985 | 3  | 12.500    |
| -C.1570412E C4 | -0.1377965E C4 | 0.2745008E C4 | 214.825 | 53.656  | 0.199502 | 4  | 16.667    |
| -C.1653246E C4 | -0.7122451E C3 | J.1636547E C4 | 232.814 | 43.563  | 0.156218 | 5  | 20.833    |
| -C.0419440E C3 | -0.1500200E C3 | 0.0605664E C3 | 141.410 | 31.902  | 0.081688 | 6  | 25.000    |
| C.1307151E C4  | -0.5205371E C3 | 0.1720521E C4 | 343.005 | 45.001  | 0.151454 | 7  | 29.167    |
| 0.2557117E C3  | 0.7040918E C3  | 0.0394277E C3 | 69.381  | 8.635   | 0.071356 | 8  | 33.333    |
| C.4006577E C3  | 0.7047686E C3  | 0.0109130E C3 | 60.367  | 6.707   | 0.068954 | 9  | 37.500    |
| C.4335011E C3  | 0.2573274E C2  | 0.4753592E C3 | 3.890   | 0.389   | 0.017368 | 10 | 41.667    |

# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 23 V= 122.5 KTS n= 1.66 g**

**FIXED HUB CHORD AT STA 18**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 789 FLT 604.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| C.5488177E 05  |                |               |         |        |          | 1  | 4.167     |
| C.5446619E 04  | 0.5720147E 05  | 0.1020503E 04 | 34.077  | 34.077 | 1.000000 | 2  | 8.333     |
| 3.3227132E 05  | 0.1845116E 04  | 3.2035547E 05 | 5.212   | 2.604  | 0.199387 | 3  | 12.500    |
| C.2075440E 04  | -0.1675671E 05 | 0.1675671E 05 | 277.081 | 52.354 | 0.165350 | 4  | 16.667    |
| C.2146111E 03  | -0.1155318E 03 | 0.1253202E 03 | 251.665 | 87.917 | 0.008094 | 5  | 20.833    |
| -3.3335357E 04 | -0.2765210E 04 | 3.4761492E 04 | 270.528 | 44.106 | 0.041742 | 6  | 25.000    |
| -C.2512542E 04 | -0.1759477E 04 | 0.2285804E 04 | 215.595 | 35.933 | 0.030262 | 7  | 29.167    |
| -C.1868227E 04 | 0.1227811E 04  | 0.4055222E 04 | 147.597 | 23.220 | 0.040018 | 8  | 33.333    |
| 3.1235738E 03  | 0.1350476E 04  | 3.1357773E 04 | 93.455  | 10.432 | 0.010361 | 9  | 37.500    |
| C.1472558E 04  | 0.2815760E 03  | 0.1656111E 04 | 4.555   | 1.062  | 0.016614 | 10 | 41.667    |
| C.2520337E 03  | 0.9074476E 03  | 0.2552579E 03 | 70.743  | 7.074  | 0.008378 |    |           |

**BLADE FLAP AT STA 174**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 789 FLT 604.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| C.2672147E 04  |                |               |         |         |          | 1  | 4.167     |
| 3.7888712E 04  | -3.3565338E 04 | 0.4250546E 04 | 317.322 | 317.322 | 1.000000 | 2  | 8.333     |
| -C.3176757E 04 | 0.9757212E 03  | 0.7162049E 04 | 16.705  | 12.483  | 0.734272 | 3  | 12.500    |
| C.2502700E 03  | 0.1811778E 04  | 0.1545126E 04 | 74.086  | 26.353  | 0.350851 | 4  | 16.667    |
| -C.0508231E 03 | -0.2361517E 03 | 3.7278269E 03 | 190.084 | 49.671  | 0.143275 | 5  | 20.833    |
| -C.0437791E 03 | -0.2554454E 02 | 0.8278257E 03 | 145.226 | 37.067  | 0.168774 | 6  | 25.000    |
| -C.2422478E 03 | -0.4522781E 03 | 0.5130710E 03 | 241.826 | 40.704  | 0.097550 | 7  | 29.167    |
| C.4554037E 03  | -0.2400106E 03 | 3.5436653E 03 | 334.163 | 47.737  | 0.134653 | 8  | 33.333    |
| C.9622427E 03  | 0.1206918E 04  | 0.1543476E 04 | 51.433  | 6.429   | 0.293461 | 9  | 37.500    |
| C.1672444E 03  | 0.4595088E 03  | 0.5184670E 03 | 51.386  | 5.710   | 0.111825 | 10 | 41.667    |
| C.4552134E 03  | -0.1776321E 02 | 0.4955256E 03 | 357.523 | 35.792  | 0.023375 |    |           |

**BLADE CHORD AT STA 174**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 789 FLT 604.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2901913E 05  |                |               |         |        |          | 1  | 4.167     |
| 0.1672472E 05  | 0.1528165E 05  | 0.2266229E 05 | 42.401  | 42.401 | 1.000000 | 2  | 8.333     |
| 0.7942543E 04  | 0.2749838E 04  | 0.8255063E 04 | 15.815  | 7.908  | 0.364264 | 3  | 12.500    |
| -0.1235425E 04 | -0.5647645E 04 | 0.9777082E 04 | 262.737 | 97.579 | 0.431381 | 4  | 16.667    |
| 0.1679645E 04  | 0.2500945E 04  | 0.3012627E 04 | 56.114  | 14.029 | 0.132936 | 5  | 20.833    |
| -0.1913203E 04 | 0.3614345E 03  | 0.1450657E 04 | 168.725 | 33.745 | 0.086084 | 6  | 25.000    |
| -0.1136522E 04 | 0.4369861E 03  | 0.1258104E 04 | 154.749 | 25.792 | 0.055546 | 7  | 29.167    |
| 0.2068267E 04  | 0.6447111E 01  | 0.2068277E 04 | 0.178   | 0.025  | 0.091245 | 8  | 33.333    |
| 0.1160571E 03  | -0.1627305E 04 | 0.1626451E 04 | 274.092 | 34.261 | 0.071769 | 9  | 37.500    |
| -0.1554714E 04 | -0.4045261E 03 | 0.1606485E 04 | 194.585 | 21.620 | 0.070988 | 10 | 41.667    |
| 0.6283262E 03  | -0.3056594E 03 | 0.7077348E 03 | 324.413 | 33.441 | 0.021230 |    |           |

**BLADE TORSION AT STA 131.5**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 789 FLT 604.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.7417051E 03 |                |               |         |        |          | 1  | 4.167     |
| 0.1492763E 04  | 0.2812606E 04  | 0.3184194E 04 | 62.043  | 62.043 | 1.000000 | 2  | 8.333     |
| -0.7330493E 03 | 0.4338027E 03  | 0.8518071E 03 | 149.385 | 74.692 | 0.267511 | 3  | 12.500    |
| 0.7381223E 03  | 0.9202051E 02  | 0.7438362E 03 | 7.106   | 2.349  | 0.233603 | 4  | 16.667    |
| -0.6490259E 03 | -0.1951081E 03 | 0.9512971E 03 | 226.980 | 56.745 | 0.298756 | 5  | 20.833    |
| -0.1709241E 04 | 0.3240587E 02  | 0.1709558E 04 | 178.897 | 35.779 | 0.536889 | 6  | 25.000    |
| -0.1170477E 04 | -0.4204971E 03 | 0.1242718E 04 | 199.761 | 33.293 | 0.350591 | 7  | 29.167    |
| 0.5142041E 02  | 0.2497192E 03  | 0.2557950E 03 | 77.487  | 11.070 | 0.080333 | 8  | 33.333    |
| 0.4940649E 03  | 0.1816108E 04  | 0.1879512E 04 | 75.075  | 9.384  | 0.550263 | 9  | 37.500    |
| 0.1445292E 03  | 0.2405028E 03  | 0.2809321E 03 | 59.038  | 6.560  | 0.098227 | 10 | 41.667    |
| -0.857976E 02  | 0.721682E 02   | 0.1121141E 03 | 139.931 | 13.993 | 0.035210 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 24 V= 121 KTS n= 1.57 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 469 CTR 953 FLT 604.0 TR 31

| AJ            | HJ            | CJ            | PHIJC         | PSIJC         | CJ/CJMAX   | J  | FREQUENCY |
|---------------|---------------|---------------|---------------|---------------|------------|----|-----------|
| 0.00000000 01 | 0.00000000 01 | 0.00000000 01 | 0.00000000 01 | 0.00000000 01 | 1.00000000 | 1  | 4.132     |
| 0.00000000 02 | 0.00000000 02 | 0.00000000 02 | 0.00000000 02 | 0.00000000 02 | 0.00000000 | 2  | 8.264     |
| 0.00000000 03 | 0.00000000 03 | 0.00000000 03 | 0.00000000 03 | 0.00000000 03 | 0.00000000 | 3  | 12.397    |
| 0.00000000 04 | 0.00000000 04 | 0.00000000 04 | 0.00000000 04 | 0.00000000 04 | 0.00000000 | 4  | 16.525    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 0.00000000 | 5  | 20.661    |
| 0.00000000 06 | 0.00000000 06 | 0.00000000 06 | 0.00000000 06 | 0.00000000 06 | 0.00000000 | 6  | 24.793    |
| 0.00000000 07 | 0.00000000 07 | 0.00000000 07 | 0.00000000 07 | 0.00000000 07 | 0.00000000 | 7  | 28.926    |
| 0.00000000 08 | 0.00000000 08 | 0.00000000 08 | 0.00000000 08 | 0.00000000 08 | 0.00000000 | 8  | 33.058    |
| 0.00000000 09 | 0.00000000 09 | 0.00000000 09 | 0.00000000 09 | 0.00000000 09 | 0.00000000 | 9  | 37.190    |
| 0.00000000 10 | 0.00000000 10 | 0.00000000 10 | 0.00000000 10 | 0.00000000 10 | 0.00000000 | 10 | 41.322    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 469 CTR 953 FLT 604.0 TR 36

| AJ            | HJ            | CJ            | PHIJC         | PSIJC         | CJ/CJMAX   | J  | FREQUENCY |
|---------------|---------------|---------------|---------------|---------------|------------|----|-----------|
| 0.00000000 04 | 0.00000000 04 | 0.00000000 04 | 0.00000000 04 | 0.00000000 04 | 1.00000000 | 1  | 4.132     |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 0.00000000 | 2  | 8.264     |
| 0.00000000 06 | 0.00000000 06 | 0.00000000 06 | 0.00000000 06 | 0.00000000 06 | 0.00000000 | 3  | 12.397    |
| 0.00000000 07 | 0.00000000 07 | 0.00000000 07 | 0.00000000 07 | 0.00000000 07 | 0.00000000 | 4  | 16.525    |
| 0.00000000 08 | 0.00000000 08 | 0.00000000 08 | 0.00000000 08 | 0.00000000 08 | 0.00000000 | 5  | 20.661    |
| 0.00000000 09 | 0.00000000 09 | 0.00000000 09 | 0.00000000 09 | 0.00000000 09 | 0.00000000 | 6  | 24.793    |
| 0.00000000 10 | 0.00000000 10 | 0.00000000 10 | 0.00000000 10 | 0.00000000 10 | 0.00000000 | 7  | 28.926    |
| 0.00000000 11 | 0.00000000 11 | 0.00000000 11 | 0.00000000 11 | 0.00000000 11 | 0.00000000 | 8  | 33.058    |
| 0.00000000 12 | 0.00000000 12 | 0.00000000 12 | 0.00000000 12 | 0.00000000 12 | 0.00000000 | 9  | 37.190    |
| 0.00000000 13 | 0.00000000 13 | 0.00000000 13 | 0.00000000 13 | 0.00000000 13 | 0.00000000 | 10 | 41.322    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 469 CTR 953 FLT 604.0 TR 11

| AJ            | HJ            | CJ            | PHIJC         | PSIJC         | CJ/CJMAX   | J  | FREQUENCY |
|---------------|---------------|---------------|---------------|---------------|------------|----|-----------|
| 0.00000000 03 | 0.00000000 03 | 0.00000000 03 | 0.00000000 03 | 0.00000000 03 | 1.00000000 | 1  | 4.132     |
| 0.00000000 04 | 0.00000000 04 | 0.00000000 04 | 0.00000000 04 | 0.00000000 04 | 0.00000000 | 2  | 8.264     |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 0.00000000 | 3  | 12.397    |
| 0.00000000 06 | 0.00000000 06 | 0.00000000 06 | 0.00000000 06 | 0.00000000 06 | 0.00000000 | 4  | 16.525    |
| 0.00000000 07 | 0.00000000 07 | 0.00000000 07 | 0.00000000 07 | 0.00000000 07 | 0.00000000 | 5  | 20.661    |
| 0.00000000 08 | 0.00000000 08 | 0.00000000 08 | 0.00000000 08 | 0.00000000 08 | 0.00000000 | 6  | 24.793    |
| 0.00000000 09 | 0.00000000 09 | 0.00000000 09 | 0.00000000 09 | 0.00000000 09 | 0.00000000 | 7  | 28.926    |
| 0.00000000 10 | 0.00000000 10 | 0.00000000 10 | 0.00000000 10 | 0.00000000 10 | 0.00000000 | 8  | 33.058    |
| 0.00000000 11 | 0.00000000 11 | 0.00000000 11 | 0.00000000 11 | 0.00000000 11 | 0.00000000 | 9  | 37.190    |
| 0.00000000 12 | 0.00000000 12 | 0.00000000 12 | 0.00000000 12 | 0.00000000 12 | 0.00000000 | 10 | 41.322    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 469 CTR 953 FLT 604.0 TR 1

| AJ            | HJ            | CJ            | PHIJC         | PSIJC         | CJ/CJMAX   | J  | FREQUENCY |
|---------------|---------------|---------------|---------------|---------------|------------|----|-----------|
| 0.00000000 04 | 0.00000000 04 | 0.00000000 04 | 0.00000000 04 | 0.00000000 04 | 1.00000000 | 1  | 4.132     |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 0.00000000 | 2  | 8.264     |
| 0.00000000 06 | 0.00000000 06 | 0.00000000 06 | 0.00000000 06 | 0.00000000 06 | 0.00000000 | 3  | 12.397    |
| 0.00000000 07 | 0.00000000 07 | 0.00000000 07 | 0.00000000 07 | 0.00000000 07 | 0.00000000 | 4  | 16.525    |
| 0.00000000 08 | 0.00000000 08 | 0.00000000 08 | 0.00000000 08 | 0.00000000 08 | 0.00000000 | 5  | 20.661    |
| 0.00000000 09 | 0.00000000 09 | 0.00000000 09 | 0.00000000 09 | 0.00000000 09 | 0.00000000 | 6  | 24.793    |
| 0.00000000 10 | 0.00000000 10 | 0.00000000 10 | 0.00000000 10 | 0.00000000 10 | 0.00000000 | 7  | 28.926    |
| 0.00000000 11 | 0.00000000 11 | 0.00000000 11 | 0.00000000 11 | 0.00000000 11 | 0.00000000 | 8  | 33.058    |
| 0.00000000 12 | 0.00000000 12 | 0.00000000 12 | 0.00000000 12 | 0.00000000 12 | 0.00000000 | 9  | 37.190    |
| 0.00000000 13 | 0.00000000 13 | 0.00000000 13 | 0.00000000 13 | 0.00000000 13 | 0.00000000 | 10 | 41.322    |



# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 24 V= 121 KTS n= 1.57 g**

**FIXED HUB CHORD AT STA 18**

HARMONIC ANALYSIS MODEL AM-504 SHIP 1009 T 469 CTR 953 FLT 604.0 TR 3

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| AJ            | BJ | CJ            | PHIJC | PSIJC         | CJ/CJMAX | J      | FREQUENCY |
|---------------|----|---------------|-------|---------------|----------|--------|-----------|
| 0.234781E-05  | 05 |               |       |               |          | 1      | 4.132     |
| 0.678345E-05  | 05 | 0.787445E-05  | 05    | 0.1033731E-05 | 49.337   | 49.337 | 1.000000  |
| 0.81460E-05   | 04 | 0.103230E-05  | 04    | 0.341040E-05  | 7.050    | 3.525  | 0.040468  |
| 0.241557E-05  | 04 | -0.138244E-05 | 05    | 0.141135E-05  | 201.507  | 73.836 | 0.135873  |
| -0.226508E-05 | 04 | 0.932610E-05  | 03    | 0.244727E-05  | 157.021  | 39.405 | 0.073582  |
| -0.175633E-05 | 04 | 0.157204E-05  | 03    | 0.175244E-05  | 174.841  | 34.978 | 0.016994  |
| -0.236372E-05 | 03 | -0.829276E-05 | 03    | 0.177237E-05  | 224.271  | 42.378 | 0.008344  |
| -0.192772E-05 | 04 | 0.440597E-05  | 03    | 0.143673E-05  | 160.685  | 22.755 | 0.018045  |
| -0.115255E-05 | 02 | 0.247283E-05  | 04    | 0.247373E-05  | 90.267   | 11.283 | 0.023815  |
| 0.173451E-05  | 04 | -0.322472E-05 | 03    | 0.176325E-05  | 344.452  | 38.328 | 0.016985  |
| 0.634252E-05  | 03 | -0.206162E-05 | 03    | 0.331031E-05  | 346.376  | 34.088 | 0.006741  |

**BLADE FLAP AT STA 174**

HARMONIC ANALYSIS MODEL AM-504 SHIP 1009 T 469 CTR 953 FLT 604.0 TR 50

| AJ            | BJ | CJ            | PHIJC | PSIJC        | CJ/CJMAX | J       | FREQUENCY |
|---------------|----|---------------|-------|--------------|----------|---------|-----------|
| 0.242551E-05  | 04 |               |       |              |          | 1       | 4.132     |
| 1.317607E-05  | 04 | -0.358362E-05 | 04    | 0.332741E-05 | 304.825  | 304.855 | 1.000000  |
| -0.234645E-05 | 04 | 0.242382E-05  | 04    | 0.372411E-05 | 137.745  | 69.072  | 0.075446  |
| -0.176815E-05 | 04 | 0.443444E-05  | 03    | 0.175233E-05 | 244.951  | 4.317   | 0.351248  |
| -0.330478E-05 | 03 | 0.304531E-05  | 03    | 0.471253E-05 | 153.340  | 32.385  | 0.080058  |
| -0.679178E-05 | 03 | 0.241437E-05  | 03    | 0.721242E-05 | 125.168  | 31.234  | 0.122767  |
| -0.637460E-05 | 03 | -0.385983E-05 | 02    | 0.521571E-05 | 183.551  | 33.592  | 0.113303  |
| -0.274601E-05 | 03 | -0.677477E-05 | 03    | 0.737227E-05 | 246.513  | 35.216  | 0.133015  |
| 0.426725E-05  | 03 | -0.404720E-05 | 03    | 0.133503E-05 | 295.233  | 36.904  | 0.180963  |
| 0.335856E-05  | 03 | -0.400007E-05 | 03    | 0.330243E-05 | 306.567  | 34.303  | 0.104472  |
| -0.635105E-05 | 02 | -0.158717E-05 | 03    | 0.354212E-05 | 263.037  | 26.304  | 0.065336  |

**BLADE CHORD AT STA 174**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 953 FLT 604.0 TR 42

| AJ            | BJ | CJ             | PHIJC | PSIJC         | CJ/CJMAX | J       | FREQUENCY |
|---------------|----|----------------|-------|---------------|----------|---------|-----------|
| 0.296668E-05  | 05 |                |       |               |          | 1       | 4.132     |
| 0.175374E-05  | 05 | 0.124690E-05   | 05    | 0.2151831E-05 | 35.413   | 35.413  | 1.000000  |
| 0.555286E-05  | 04 | -0.124531E-05  | 04    | 0.5690801E-05 | 347.359  | 173.680 | 0.264463  |
| -0.621978E-05 | 04 | -0.4593801E-05 | 04    | 0.7732313E-05 | 214.444  | 72.150  | 0.359336  |
| 0.105258E-05  | 04 | -0.5086299E-05 | 03    | 0.1169031E-05 | 334.709  | 83.552  | 0.054327  |
| 0.209407E-05  | 04 | 0.915475E-05   | 03    | 0.227628E-05  | 23.714   | 4.743   | 0.105784  |
| 0.256327E-05  | 03 | -0.166044E-05  | 03    | 0.305407E-05  | 127.064  | 54.511  | 0.014193  |
| -0.638393E-05 | 03 | 0.134994E-05   | 03    | 0.6525103E-05 | 168.060  | 24.069  | 0.030373  |
| -0.193015E-05 | 04 | 0.126752E-05   | 04    | 0.2309174E-05 | 146.708  | 18.338  | 0.107312  |
| 0.136414E-05  | 04 | -0.749584E-05  | 03    | 0.1556510E-05 | 331.212  | 36.801  | 0.072334  |
| 0.183792E-05  | 03 | -0.1404574E-05 | 02    | 0.184324E-05  | 355.630  | 35.563  | 0.008566  |

**BLADE TORSION AT STA 131.5**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 469 CTR 953 FLT 604.0 TR 44

| AJ            | BJ | CJ            | PHIJC | PSIJC         | CJ/CJMAX | J       | FREQUENCY |
|---------------|----|---------------|-------|---------------|----------|---------|-----------|
| -0.406448E-05 | 03 |               |       |               |          | 1       | 4.132     |
| 0.217907E-05  | 04 | 0.179745E-05  | 04    | 0.2524704E-05 | 39.519   | 39.519  | 1.000000  |
| -0.939347E-05 | 03 | 0.714043E-05  | 03    | 0.1182961E-05 | 142.567  | 71.283  | 0.418791  |
| 0.417601E-05  | 03 | -0.217426E-05 | 02    | 0.418276E-05  | 357.620  | 119.007 | 0.148060  |
| -0.622750E-05 | 03 | 0.816073E-05  | 02    | 0.628074E-05  | 172.534  | 43.134  | 0.272350  |
| -0.234402E-05 | 03 | 0.269682E-05  | 03    | 0.900716E-05  | 101.084  | 21.017  | 0.318872  |
| -0.854951E-05 | 03 | 0.104704E-05  | 03    | 0.841965E-05  | 172.688  | 28.781  | 0.305152  |
| 0.141545E-05  | 03 | -0.310701E-05 | 03    | 0.341060E-05  | 294.520  | 42.074  | 0.120742  |
| 0.850347E-05  | 03 | -0.661170E-05 | 03    | 0.110899E-05  | 323.402  | 40.425  | 0.392605  |
| 0.243522E-05  | 03 | -0.234036E-05 | 03    | 0.341235E-05  | 315.513  | 35.059  | 0.120804  |
| 0.120124E-05  | 03 | 0.434692E-05  | 02    | 0.127714E-05  | 19.851   | 1.985   | 0.045213  |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 25 V= 111 KTS n= 1 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-50A SHIP 1039 T 405 CTR 180 FLT 500.0 TR 31

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.6514573E-01  |                |               |         |         |          |    |           |
| 0.4657330E-01  | -0.4110741E-01 | 0.6363313E-01 | 319.759 | 319.759 | 1.000000 | 1  | 4.098     |
| -0.5321929E-01 | -0.3530062E-01 | 0.3333374E-01 | 261.355 | 130.678 | 0.055645 | 2  | 8.197     |
| -0.4677477E-01 | -0.4641411E-01 | 0.1035006E-01 | 243.274 | 81.391  | 0.017052 | 3  | 12.295    |
| 0.1496313E-02  | 0.8103538E-01  | 0.8104914E-01 | 88.942  | 22.230  | 0.012737 | 4  | 16.393    |
| -0.3434054E-01 | 0.1234233E-01  | 0.3622637E-01 | 159.996 | 31.999  | 0.005693 | 5  | 20.492    |
| -0.1067331E-01 | -0.2741341E-02 | 0.1133235E-01 | 194.656 | 32.443  | 0.001734 | 6  | 24.590    |
| -0.3520592E-01 | -0.6084044E-02 | 0.3612213E-01 | 192.932 | 27.562  | 0.005677 | 7  | 28.689    |
| 0.1436228E-01  | 0.1373342E-01  | 0.2023377E-01 | 42.739  | 5.342   | 0.003180 | 8  | 32.787    |
| -0.1356330E-01 | 0.1052040E-02  | 0.1530434E-01 | 152.563 | 16.951  | 0.002405 | 9  | 36.885    |
| 0.4514456E-02  | -0.6456770E-02 | 0.3057113E-02 | 306.738 | 30.674  | 0.001266 | 10 | 40.984    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-50A SHIP 1039 T 405 CTR 180 FLT 500.0 TR 36

| AJ             | HJ             | CJ             | PHIJC   | PSIJC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|----------------|---------|---------|-----------|----|-----------|
| -0.8775538E-04 |                |                |         |         |           |    |           |
| 0.4624514E-03  | 0.6444419E-03  | 0.7372673E-03  | 54.546  | 54.546  | 1.000000  | 1  | 4.098     |
| -0.2864470E-04 | -0.1154201E-04 | 0.3318639E-04  | 201.944 | 100.972 | 0.038740  | 2  | 8.197     |
| -0.5962133E-04 | -0.2160369E-05 | 0.2246914E-05  | 254.612 | 84.871  | 0.0281827 | 3  | 12.295    |
| -0.8442501E-03 | 0.1263612E-04  | 0.1513699E-04  | 123.748 | 30.937  | 0.019061  | 4  | 16.393    |
| -0.2930103E-03 | 0.5404586E-04  | 0.59911214E-04 | 92.715  | 18.543  | 0.074143  | 5  | 20.492    |
| 0.7761444E-03  | 0.1003244E-03  | 0.7445077E-03  | 7.347   | 1.224   | 0.009841  | 6  | 24.590    |
| 0.1240660E-04  | -0.1754588E-05 | 0.2173163E-04  | 306.338 | 43.763  | 0.027320  | 7  | 28.689    |
| -0.1730426E-03 | 0.5266000E-02  | 0.1416143E-03  | 167.342 | 20.418  | 0.002276  | 8  | 32.787    |
| 0.2550126E-04  | 0.1267809E-04  | 0.3335433E-04  | 22.966  | 2.552   | 0.038826  | 9  | 36.885    |
| 0.3902464E-03  | -0.2959931E-03 | 0.4422643E-03  | 322.453 | 32.242  | 0.006174  | 10 | 40.984    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-50A SHIP 1039 T 405 CTR 180 FLT 500.0 TR 11

| AJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2551116E-03 |                |               |         |         |          |    |           |
| -0.2235500E-03 | -0.8482150E-02 | 0.2371333E-03 | 200.775 | 200.775 | 1.000000 | 1  | 4.098     |
| 0.1160301E-03  | -0.4163229E-02 | 0.1232461E-03 | 343.257 | 170.129 | 0.515375 | 2  | 8.197     |
| -0.5942594E-02 | -0.1424931E-03 | 0.1545442E-03 | 247.223 | 82.408  | 0.046254 | 3  | 12.295    |
| -0.7375570E-02 | -0.2673853E-02 | 0.7915037E-02 | 201.288 | 50.322  | 0.331006 | 4  | 16.393    |
| -0.7324283E-02 | 0.6716638E-01  | 0.7833355E-02 | 175.044 | 35.319  | 0.328389 | 5  | 20.492    |
| -0.4661794E-01 | 0.1416443E-02  | 0.1973044E-02 | 103.756 | 17.293  | 0.082506 | 6  | 24.590    |
| 0.6081285E-01  | -0.1604465E-01 | 0.5239180E-01 | 345.220 | 49.317  | 0.026300 | 7  | 28.689    |
| 0.1702472E-02  | 0.2679800E-02  | 0.2687745E-02 | 50.697  | 6.337   | 0.112393 | 8  | 32.787    |
| -0.1124522E-02 | 0.5868117E-01  | 0.1272457E-02 | 152.546 | 16.950  | 0.053227 | 9  | 36.885    |
| 0.5810506E-01  | -0.3983833E-01 | 0.705391E-01  | 325.564 | 32.556  | 0.029460 | 10 | 40.984    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-50A SHIP 1039 T 405 CTR 180 FLT 500.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1779328E-03  |                |               |         |         |          |    |           |
| 0.3466611E-04  | 0.4776770E-04  | 0.5932227E-04 | 54.029  | 54.029  | 1.000000 | 1  | 4.098     |
| 0.2307757E-04  | -0.2345634E-04 | 0.3270553E-04 | 314.533 | 157.267 | 0.557510 | 2  | 8.197     |
| -0.3234457E-04 | -0.4468977E-04 | 0.5519545E-04 | 234.062 | 78.021  | 0.935170 | 3  | 12.295    |
| -0.2660307E-04 | 0.3053535E-03  | 0.2677777E-04 | 173.452 | 43.363  | 0.453689 | 4  | 16.393    |
| -0.2300115E-04 | 0.1356536E-04  | 0.2676061E-04 | 149.568 | 29.914  | 0.453741 | 5  | 20.492    |
| -0.4146458E-03 | 0.4894458E-03  | 0.1070035E-04 | 112.991 | 18.632  | 0.182141 | 6  | 24.590    |
| -0.3944382E-02 | 0.7357648E-03  | 0.7358533E-03 | 93.107  | 13.301  | 0.124843 | 7  | 28.689    |
| 0.1154493E-04  | 0.4642300E-03  | 0.1523202E-04 | 40.546  | 5.074   | 0.257574 | 8  | 32.787    |
| -0.5587135E-02 | 0.1201932E-04  | 0.1235117E-04 | 92.657  | 10.275  | 0.204194 | 9  | 36.885    |
| 0.2785125E-03  | 0.9251465E-03  | 0.9051602E-03 | 73.242  | 7.324   | 0.163698 | 10 | 40.984    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 25 V= 111 KTS n= 1 g

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FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1003 T 405 CTR 180 FLT 500.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.7380544F 05  |                |               |         |        |          | 1  | 4.098     |
| 0.8144400E 05  | 0.8266269E 05  | 0.1029775E 06 | 53.376  | 53.376 | 1.000000 | 2  | 8.197     |
| 0.1205304F 05  | 0.1761975E 05  | 0.2137035E 05 | 55.537  | 21.768 | 0.207486 | 3  | 12.295    |
| -0.7166376E 05 | -0.1108331E 05 | 0.1110647E 05 | 266.259 | 88.766 | 0.107832 | 4  | 16.393    |
| 0.5787472E 02  | 0.5667122F 03  | 0.3536593E 03 | 84.164  | 21.342 | 0.005531 | 5  | 20.492    |
| -0.6440723F 03 | 0.1317623F 04  | 0.1465327E 04 | 115.429 | 23.166 | 0.014227 | 6  | 24.590    |
| 0.3500546E 03  | -0.1247591F 04 | 0.1334333E 04 | 285.211 | 47.535 | 0.012955 | 7  | 28.689    |
| 0.6434626E 03  | 0.3536849E 04  | 0.7343967E 04 | 24.237  | 4.185  | 0.007130 | 8  | 32.787    |
| -0.3811271F 02 | 0.1500057F 04  | 0.1536534E 04 | 91.453  | 11.431 | 0.014627 | 9  | 36.885    |
| 0.9598516E 03  | -0.2707692F 04 | 0.2372734E 04 | 289.519 | 32.164 | 0.027892 | 10 | 40.984    |
| 0.5925554E 02  | -0.6060901E 03 | 0.5573501E 03 | 273.706 | 27.371 | 0.005897 |    |           |

BLADE FLAP AT STA 150.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 180 FLT 500.0 TR 19

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1274303E 05  |                |               |         |         |          | 1  | 4.098     |
| 0.4536727E 04  | -0.2751004E 04 | 0.3326503E 04 | 328.400 | 328.400 | 1.000000 | 2  | 8.197     |
| -0.1664265F 04 | 0.7947737F 03  | 0.1348331E 04 | 154.540 | 77.273  | 0.347100 | 3  | 12.295    |
| 0.2822720E 03  | 0.1304503F 04  | 0.1339581E 04 | 77.336  | 25.945  | 0.251494 | 4  | 16.393    |
| 0.4764436E 03  | -0.3438236F 03 | 0.5879437E 03 | 324.211 | 61.053  | 0.110380 | 5  | 20.492    |
| 0.8767492E 02  | -0.7003662F 03 | 0.7033330E 03 | 277.136 | 55.427  | 0.132513 | 6  | 24.590    |
| -0.1731754F 02 | -0.1180435F 02 | 0.2076123E 02 | 214.293 | 35.715  | 0.039355 | 7  | 28.689    |
| 0.9754660F 02  | -0.4611652E 02 | 0.1378933E 03 | 334.697 | 47.314  | 0.020257 | 8  | 32.787    |
| 0.2307380E 03  | 0.5438613E 03  | 0.6104922E 03 | 62.911  | 7.464   | 0.115741 | 9  | 36.885    |
| -0.1333130E 03 | 0.2679684E 03  | 0.2433134E 03 | 116.448 | 12.939  | 0.056194 | 10 | 40.984    |
| 0.8454214E 02  | 0.4538492E 02  | 0.1033672E 03 | 26.878  | 2.688   | 0.018847 |    |           |

BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 180 FLT 500.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1694793F 04  |                |               |         |         |          | 1  | 4.098     |
| 0.3106057F 04  | -0.3904814F 04 | 0.4987504E 04 | 308.500 | 308.500 | 1.000000 | 2  | 8.197     |
| -0.3054404E 04 | 0.5093852E 03  | 0.3377032E 04 | 170.534 | 85.267  | 0.620719 | 3  | 12.295    |
| 0.5939526F 03  | 0.1021161F 04  | 0.1131334E 04 | 59.816  | 19.939  | 0.236764 | 4  | 16.393    |
| -0.3756074E 03 | 0.1753459E 02  | 0.3703553E 03 | 177.266 | 44.317  | 0.075365 | 5  | 20.492    |
| -0.3565332E 03 | 0.3427224F 03  | 0.5334214F 03 | 132.235 | 26.447  | 0.106307 | 6  | 24.590    |
| -0.7714257F 02 | 0.1670123E 03  | 0.2323175E 03 | 112.430 | 18.738  | 0.040549 | 7  | 28.689    |
| 0.3765557E 03  | -0.5809624F 02 | 0.3827975E 03 | 351.275 | 50.182  | 0.076759 | 8  | 32.787    |
| 0.1667171E 04  | -0.6262910E 03 | 0.1797663E 04 | 339.635 | 42.454  | 0.360690 | 9  | 36.885    |
| 0.7186387F 03  | 0.2585921E 02  | 0.7131033E 03 | 2.061   | 0.229   | 0.144123 | 10 | 40.984    |
| 0.6600427E 02  | 0.1231718F 03  | 0.1377421E 03 | 61.814  | 6.181   | 0.028007 |    |           |

BLADE FLAP AT STA 205

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 180 FLT 500.0 TR 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.8407444E 04 |                |               |         |         |          | 1  | 4.098     |
| -0.1466482E 04 | 0.3352838E 04  | 0.3931577E 04 | 120.349 | 120.349 | 1.000000 | 2  | 8.197     |
| 0.3616204F 04  | -0.1519388E 03 | 0.3619374E 04 | 357.594 | 178.797 | 0.920591 | 3  | 12.295    |
| 0.6206214E 02  | -0.9508507E 03 | 0.9528749E 03 | 273.734 | 91.245  | 0.242365 | 4  | 16.393    |
| 0.8511654F 03  | -0.3563950F 03 | 0.9236524E 03 | 337.169 | 84.292  | 0.234931 | 5  | 20.492    |
| 0.2316213E 03  | -0.5526691E 03 | 0.6359806E 03 | 291.356 | 58.271  | 0.161914 | 6  | 24.590    |
| -0.5173456E 02 | -0.2220366E 03 | 0.2277843E 03 | 256.884 | 42.814  | 0.057988 | 7  | 28.689    |
| -0.1651136E 03 | -0.9568770E 02 | 0.2335593E 03 | 207.523 | 29.618  | 0.052996 | 8  | 32.787    |
| -0.4324070F 03 | 0.1327852E 03  | 0.4257433E 03 | 161.738 | 20.217  | 0.107780 | 9  | 36.885    |
| -0.1641186F 03 | -0.7213636E 02 | 0.1742722E 03 | 203.727 | 22.636  | 0.045598 | 10 | 40.984    |
| 0.8090430F 02  | -0.5276814E 02 | 0.9606277E 02 | 326.876 | 32.688  | 0.024571 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 25 V= 111 KTS n= 1 g

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BLADE FLAP AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 180 FLT 500.0 TR 4

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1220000E 04  |                |               |         |         |          |    |           |
| 0.4040000E 02  | 0.1407020E 04  | 0.1908222E 04 | 88.589  | 88.589  | 0.673601 | 1  | 4.098     |
| 0.2510181E 04  | -0.1402137E 03 | 0.2921707E 04 | 357.092 | 178.546 | 1.000000 | 2  | 8.197     |
| 0.4334716E 03  | -0.4550579E 03 | 0.6504177E 03 | 311.169 | 103.730 | 0.225506 | 3  | 12.295    |
| 0.1097899E 04  | -0.3505034E 03 | 0.1152430E 04 | 342.294 | 85.574  | 0.344426 | 4  | 16.393    |
| -0.2520200E 02 | -0.6051855E 03 | 0.6050523E 03 | 207.430 | 53.500  | 0.227815 | 5  | 20.492    |
| -0.1402541E 03 | 0.2011133E 03  | 0.2452121E 03 | 124.899 | 20.817  | 0.063921 | 6  | 24.590    |
| 0.3463207E 03  | 0.0150041E 02  | 0.3357471E 03 | 13.242  | 1.442   | 0.121764 | 7  | 28.689    |
| 0.1070335E 04  | 0.1800000E 03  | 0.1000474E 04 | 9.669   | 1.236   | 0.371834 | 8  | 32.787    |
| 0.5528001E 03  | 0.1453972E 03  | 0.3532250E 03 | 19.467  | 2.163   | 0.200663 | 9  | 36.885    |
| 0.1101506E 03  | 0.183394E 03   | 0.2133334E 03 | 59.009  | 5.901   | 0.073216 | 10 | 40.984    |

BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 180 FLT 500.0 TR 26

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2532143E 04 |                |               |         |         |          |    |           |
| 0.1169341E 04  | 0.1580043E 03  | 0.1183122E 04 | 7.736   | 7.736   | 0.727367 | 1  | 4.098     |
| 0.1621675E 04  | 0.3954779E 02  | 0.1622457E 04 | 1.397   | 0.698   | 1.000000 | 2  | 8.197     |
| 0.5317070E 03  | -0.2054143E 03 | 0.5733081E 03 | 338.880 | 112.960 | 0.351369 | 3  | 12.295    |
| 0.1104070E 04  | 0.1002544E 03  | 0.1139360E 04 | 5.185   | 1.296   | 0.683744 | 4  | 16.393    |
| -0.1045170E 03 | -0.5508702E 03 | 0.3763074E 03 | 252.894 | 50.574  | 0.355244 | 5  | 20.492    |
| -0.1204070E 03 | 0.3251904E 03  | 0.3404208E 03 | 110.309 | 18.398  | 0.213828 | 6  | 24.590    |
| 0.6501050E 03  | 0.2351411E 03  | 0.6303055E 03 | 19.717  | 2.817   | 0.429576 | 7  | 28.689    |
| 0.1275740E 04  | 0.8458000E 03  | 0.1532230E 04 | 33.629  | 4.204   | 0.944393 | 8  | 32.787    |
| 0.6310371E 03  | 0.1237438E 03  | 0.6433055E 03 | 11.095  | 1.233   | 0.340347 | 9  | 36.885    |
| -0.3273740E 03 | -0.6150773E 01 | 0.3277300E 03 | 181.426 | 18.143  | 0.201840 | 10 | 40.984    |

BLADE CHORD AT STA 103

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 180 FLT 500.0 TR 17

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1732545E 06  |                |               |         |        |          |    |           |
| 0.2287141E 05  | 0.1460236E 05  | 0.2713582E 05 | 32.556  | 32.556 | 1.000000 | 1  | 4.098     |
| -0.2210167E 04 | 0.6810000E 04  | 0.7183301E 04 | 107.979 | 53.390 | 0.263869 | 2  | 8.197     |
| -0.7645134E 02 | -0.9770234E 03 | 0.9803133E 03 | 265.526 | 88.509 | 0.036115 | 3  | 12.295    |
| 0.2747561E 04  | 0.1034670E 03  | 0.2749327E 04 | 2.167   | 0.542  | 0.101339 | 4  | 16.393    |
| 0.6593051E 03  | -0.8004408E 03 | 0.1344323E 04 | 307.254 | 61.451 | 0.040118 | 5  | 20.492    |
| 0.1235034E 03  | 0.3115808E 03  | 0.3355313E 03 | 68.400  | 11.400 | 0.012366 | 6  | 24.590    |
| 0.2430060E 03  | 0.3106063E 02  | 0.2431337E 03 | 7.428   | 1.061  | 0.009332 | 7  | 28.689    |
| -0.2013281E 02 | -0.2504740E 03 | 0.2476005E 03 | 260.122 | 33.265 | 0.010969 | 8  | 32.787    |
| -0.1013644E 04 | 0.1652708E 04  | 0.1933833E 04 | 121.527 | 13.503 | 0.071452 | 9  | 36.885    |
| 0.2107085E 03  | 0.5311547E 03  | 0.3744241E 03 | 67.620  | 6.762  | 0.021169 | 10 | 40.984    |

BLADE CHORD AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 180 FLT 500.0 TR 22

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.2400470E 05 |                |               |         |        |          |    |           |
| 0.4218453E 04  | 0.507664E 04   | 0.7178043E 04 | 54.007  | 54.007 | 1.000000 | 1  | 4.098     |
| 0.1821057E 04  | 0.1824770E 04  | 0.2332115E 04 | 95.125  | 22.562 | 0.354724 | 2  | 8.197     |
| -0.6446072E 03 | -0.1752317E 04 | 0.1307113E 04 | 249.803 | 83.268 | 0.260115 | 3  | 12.295    |
| 0.6700384E 03  | -0.3360334E 03 | 0.7556663E 03 | 333.597 | 83.399 | 0.105274 | 4  | 16.393    |
| 0.6347500E 02  | 0.5340042E 03  | 0.5348423E 03 | 23.222  | 10.044 | 0.074929 | 5  | 20.492    |
| 0.3450067E 03  | 0.6620355E 03  | 0.7406116E 03 | 62.472  | 10.412 | 0.104013 | 6  | 24.590    |
| 0.5500784E 03  | -0.2916587E 03 | 0.5220102E 03 | 332.067 | 47.438 | 0.080739 | 7  | 28.689    |
| 0.1325337E 03  | -0.1104424E 04 | 0.1112352E 04 | 276.843 | 34.005 | 0.154900 | 8  | 32.787    |
| -0.1344570E 04 | 0.2842887E 04  | 0.3146301E 04 | 115.345 | 12.822 | 0.438413 | 9  | 36.885    |
| -0.2532531E 03 | 0.1883375E 03  | 0.3150350E 03 | 143.367 | 14.337 | 0.043973 | 10 | 40.984    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 25 V= 111 KTS n= 1 g

PLANE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AM-36A SHIP 1009 T 405 CTR 180 FLT 500.0 TR 44

OVERALL CYCLIC LOAD = 0.43953CE 04

ZERO POSITION USED 1.49 LOAD/IN USED 12705.00

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2494C24E 03  |                | 0.2628344E 04 | 37.721  | 37.721 | 1.000000 | 1  | 4.098     |
| 0.2071C21F 04  | 0.16C6070F 04  | 0.1046547E 04 | 153.119 | 76.559 | 0.396196 | 2  | 8.197     |
| -0.9335078F 03 | 0.4732117E 03  | 0.3233469E 03 | 67.046  | 22.349 | 0.123804 | 3  | 12.295    |
| 0.1264C09E 03  | 0.2996J43E C3  | 0.2778916E 03 | 122.275 | 30.569 | 0.105729 | 4  | 16.393    |
| -0.1463E94F 03 | 0.2349559E C3  | 0.5563800E 03 | 66.247  | 13.249 | 0.212445 | 5  | 20.492    |
| 0.2249C06F 03  | 0.5110623E 03  | 0.7767450E 02 | 187.876 | 31.313 | 0.029560 | 6  | 24.590    |
| -0.7646164E 02 | -0.1C64673E 02 | 0.2028139E 03 | 0.956   | 0.137  | 0.077164 | 7  | 28.689    |
| 0.2027856F 03  | 0.3385098E 01  | 0.1209845E 04 | 5.135   | 0.642  | 0.460306 | 8  | 32.787    |
| 0.1204590E 04  | 0.1082611E 03  | 0.3111655E 03 | 32.164  | 3.574  | 0.118388 | 9  | 36.885    |
| 0.2634104E 03  | 0.165647CE 03  | 0.3375189E 02 | 337.686 | 33.769 | 0.031865 | 10 | 40.984    |
| 0.7748C30E 02  | -0.3179915E 02 |               |         |        |          |    |           |

# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 26 V= 173 KTS n= 1.15 g**

## **BLADE FEATHER ANGLE**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 252 FLT 500.0 TR 31

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.0319443F C1  |                |               |         |         |          |    |           |
| 0.0325393E 01  | -0.4441025E 01 | 0.6023557E 01 | 311.934 | 311.934 | 1.000000 | 1  | 4.167     |
| -0.3356506F 00 | -0.3538746E 00 | 0.4675030E 00 | 229.161 | 114.551 | 0.077629 | 2  | 8.333     |
| -0.5334199E 01 | 0.9698205E 02  | 0.5427355E 01 | 169.706 | 56.569  | 0.009010 | 3  | 12.500    |
| 0.3357655E 01  | -0.5058443E 01 | 0.5425132E 01 | 300.944 | 75.236  | 0.009870 | 4  | 16.667    |
| 0.6132054E 02  | -0.4101707E 01 | 0.4147205E 01 | 218.503 | 55.701  | 0.006865 | 5  | 20.833    |
| 0.5407665E 02  | 0.3303406E 01  | 0.3347305E 01 | 83.704  | 13.451  | 0.005557 | 6  | 25.000    |
| -0.3847412E 03 | -0.1701769E 01 | 0.1732203E 01 | 268.705 | 38.386  | 0.002826 | 7  | 29.167    |
| -0.1255769E 03 | -0.1210429E 01 | 0.1745375E 01 | 223.454 | 27.445  | 0.002896 | 8  | 33.333    |
| -0.9274535E 02 | -0.4675051E 03 | 0.4238314E 02 | 182.886 | 20.321  | 0.001542 | 9  | 37.500    |
| -0.4157644E 02 | 0.3713541E 02  | 0.3328755E 02 | 157.429 | 15.793  | 0.001641 | 10 | 41.667    |

## **SHAFT MOMENT**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 252 FLT 500.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.5776055F 04 |                |               |         |         |          |    |           |
| -0.3498276F 05 | 0.1176506E 06  | 0.1242537E 06 | 108.770 | 108.770 | 1.000000 | 1  | 4.167     |
| -0.9166206F 03 | -0.1379082E 04 | 0.1355917E 04 | 236.340 | 118.195 | 0.013326 | 2  | 8.333     |
| -0.7557816E 04 | -0.2601938E 05 | 0.2432373E 05 | 254.904 | 84.968  | 0.233551 | 3  | 12.500    |
| 0.9475271E 02  | 0.1358652E 04  | 0.1431355E 04 | 86.125  | 21.531  | 0.011282 | 4  | 16.667    |
| 0.5070535E 04  | 0.8455996E 03  | 0.5141219E 04 | 4.512   | 1.902   | 0.041375 | 5  | 20.833    |
| 0.2208142E 03  | -0.1084256E 04 | 0.1136513E 04 | 281.511 | 46.919  | 0.008905 | 6  | 25.000    |
| -0.3254221E 04 | -0.4167329E 03 | 0.3255354E 04 | 187.266 | 26.755  | 0.020444 | 7  | 29.167    |
| -0.5163555F 03 | 0.1034736E 04  | 0.1161770E 04 | 116.500 | 14.563  | 0.009350 | 8  | 33.333    |
| -0.3141710F 03 | -0.4465410E 03 | 0.5375857E 03 | 237.678 | 26.409  | 0.004729 | 9  | 37.500    |
| 0.1262700F 03  | -0.9833883E 02 | 0.1620215E 03 | 322.343 | 32.234  | 0.001304 | 10 | 41.667    |

## **PITCH LINK TENSION**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 252 FLT 500.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2261646E 03 |                |               |         |         |          |    |           |
| -0.3102652F 03 | -0.2420303E 02 | 0.1116303E 03 | 185.377 | 185.377 | 0.683304 | 1  | 4.167     |
| 0.9358633E 03  | -0.3107478E 03 | 0.4560101E 03 | 317.054 | 158.527 | 1.000000 | 2  | 8.333     |
| -0.9449443F 01 | -0.2321208E 03 | 0.2323053E 03 | 267.718 | 84.239  | 0.509327 | 3  | 12.500    |
| -0.5068652E 02 | -0.6640657E 02 | 0.3354035E 02 | 232.646 | 58.162  | 0.183162 | 4  | 16.667    |
| -0.3695165F 02 | -0.1501614F 02 | 0.3737213E 02 | 202.112 | 40.422  | 0.087465 | 5  | 20.833    |
| -0.4037660F 02 | 0.5325020E 02  | 0.6682828E 02 | 127.172 | 21.195  | 0.146520 | 6  | 25.000    |
| -0.8920420E 01 | -0.2186721E 02 | 0.2357705E 02 | 246.051 | 35.436  | 0.051738 | 7  | 29.167    |
| 0.1343253F 02  | -0.3666850F 02 | 0.3405137E 02 | 290.119 | 36.265  | 0.085620 | 8  | 33.333    |
| -0.2570025E 00 | 0.7276581E 01  | 0.7241115E 01 | 92.023  | 10.225  | 0.015964 | 9  | 37.500    |
| 0.1659004E 02  | -0.1837211E 01 | 0.1669153E 02 | 353.681 | 35.368  | 0.036596 | 10 | 41.667    |

## **FIXED HUB FLAP AT STA 18**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 252 FLT 500.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1473546E 05 |                |               |         |         |          |    |           |
| -0.2432526F 04 | 0.2868700F 05  | 0.2378935E 05 | 94.847  | 94.847  | 1.000000 | 1  | 4.167     |
| 0.2456720F 04  | -0.1867841E 05 | 0.1481621E 05 | 276.889 | 138.444 | 0.653500 | 2  | 8.333     |
| -0.7760514F 03 | -0.6602480F 04 | 0.6648003E 04 | 263.291 | 87.764  | 0.230914 | 3  | 12.500    |
| -0.1520595F 04 | -0.6902290E 03 | 0.1414547E 04 | 213.073 | 53.268  | 0.063029 | 4  | 16.667    |
| 0.1551143F 04  | 0.4803677E 02  | 0.1554233E 04 | 3.616   | 0.723   | 0.053985 | 5  | 20.833    |
| 0.1791655F 03  | -0.5732942E 02 | 0.2034325E 03 | 344.454 | 57.492  | 0.007136 | 6  | 25.000    |
| -0.6557126E 03 | 0.4186544F 03  | 0.7710753E 03 | 147.433 | 21.061  | 0.027026 | 7  | 29.167    |
| 0.5634583F 03  | -0.5207881E 03 | 0.7637412E 03 | 317.355 | 34.669  | 0.026702 | 8  | 33.333    |
| 0.1045814E 03  | 0.3860054F 03  | 0.4012583E 03 | 74.151  | 8.239   | 0.013937 | 9  | 37.500    |
| 0.2088485F 03  | -0.1584014F 03 | 0.2621233E 03 | 322.821 | 32.282  | 0.009105 | 10 | 41.667    |



# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 26 V= 173 KTS n= 1.15 g**

FIXED HUB CHORD AT STA 18  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 Y 405 CTR 252 FLT 500.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.5207112E 05  |                |               |         |        |          |    |           |
| 0.1429331E 05  | 0.1155040E 04  | 0.1164503E 04 | 82.948  | 82.948 | 1.000000 | 1  | 4.167     |
| 0.1049003E 05  | 0.3310510E 04  | 0.1148721E 05 | 16.761  | 8.390  | 0.098645 | 2  | 8.333     |
| -0.1251778E 05 | -0.1501158E 05 | 0.1794540E 05 | 230.176 | 76.725 | 0.167848 | 3  | 12.500    |
| 0.1545041E 03  | 0.1540214E 04  | 0.1555414E 04 | 84.244  | 21.073 | 0.013344 | 4  | 16.667    |
| 0.1062502E 03  | 0.1807913E 04  | 0.1315511E 04 | 84.745  | 16.949 | 0.015591 | 5  | 20.833    |
| 0.1228611E 04  | -0.1437263E 04 | 0.2274031E 04 | 302.383 | 50.397 | 0.019700 | 6  | 25.000    |
| 0.1033529E 04  | 0.3267003E 03  | 0.1034528E 04 | 17.646  | 2.521  | 0.009314 | 7  | 29.167    |
| -0.4444020E 03 | -0.3325125E 03 | 0.1031006E 04 | 199.389 | 24.924 | 0.008601 | 8  | 33.333    |
| -0.5548444E 03 | -0.3451374E 03 | 0.0525813E 03 | 211.734 | 23.526 | 0.006602 | 9  | 37.500    |
| -0.1875356E 03 | -0.2749566E 00 | 0.1475360E 03 | 180.084 | 18.008 | 0.00610  | 10 | 41.667    |

BLADE FLAP AT STA 130.5  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 Y 405 CTR 252 FLT 500.0 TR 19

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.9840262E 04  |                |               |         |         |          |    |           |
| 0.4863391E 04  | -0.2876717E 04 | 0.5650492E 04 | 329.396 | 329.396 | 0.917795 | 1  | 4.167     |
| -0.2375815E 04 | 0.5674831E 04  | 0.6150574E 04 | 112.698 | 50.344  | 1.000000 | 2  | 8.333     |
| 0.2453491E 03  | 0.1822600E 04  | 0.1840050E 04 | 80.857  | 26.952  | 0.259850 | 3  | 12.500    |
| 0.7524516E 03  | 0.2014805E 03  | 0.3033443E 03 | 20.542  | 5.136   | 0.130525 | 4  | 16.667    |
| -0.7805392E 03 | 0.4442491E 02  | 0.7500273E 03 | 173.106 | 34.621  | 0.127770 | 5  | 20.833    |
| -0.5904522E 03 | 0.4656938E 03  | 0.7524241E 03 | 141.762 | 23.627  | 0.122214 | 6  | 25.000    |
| -0.2307412E 03 | -0.2467252E 03 | 0.3434068E 03 | 225.965 | 32.281  | 0.055788 | 7  | 29.167    |
| 0.2385345E 03  | -0.1754089E 03 | 0.3376033E 03 | 328.703 | 41.088  | 0.054867 | 8  | 33.333    |
| -0.1201025E 03 | -0.1747735E 03 | 0.2175713E 03 | 234.452 | 26.106  | 0.035668 | 9  | 37.500    |
| 0.2023105E 03  | -0.1504598E 03 | 0.2778564E 03 | 316.728 | 31.673  | 0.045132 | 10 | 41.667    |

BLADE FLAP AT STA 174  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 Y 405 CTR 252 FLT 500.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1603871E 04  |                |               |         |         |          |    |           |
| 0.4047510E 04  | -0.4883660E 04 | 0.6342906E 04 | 309.651 | 309.651 | 1.000000 | 1  | 4.167     |
| -0.2304517E 04 | 0.4485848E 04  | 0.3323434E 04 | 115.423 | 57.712  | 0.870332 | 2  | 8.333     |
| 0.2225430E 04  | 0.1782834E 04  | 0.2651503E 04 | 38.694  | 12.903  | 0.449558 | 3  | 12.500    |
| -0.6814467E 03 | -0.7640082E 02 | 0.6861136E 03 | 186.393 | 46.598  | 0.108170 | 4  | 16.667    |
| -0.3899230E 02 | 0.5038376E 03  | 0.3108845E 03 | 106.444 | 21.300  | 0.049954 | 5  | 20.833    |
| -0.2814550E 03 | 0.2313001E 03  | 0.3645342E 03 | 140.541 | 23.432  | 0.057440 | 6  | 25.000    |
| -0.6704712E 03 | 0.5525002E 03  | 0.4631714E 03 | 140.531 | 20.076  | 0.137030 | 7  | 29.167    |
| -0.3027644E 03 | -0.4271497E 03 | 0.5210131E 03 | 234.672 | 24.334  | 0.082552 | 8  | 33.333    |
| -0.3135574E 03 | 0.6545675E 01  | 0.3135257E 03 | 176.803 | 19.867  | 0.049445 | 9  | 37.500    |
| -0.2350672E 03 | 0.1842944E 03  | 0.3323862E 03 | 141.244 | 14.124  | 0.047673 | 10 | 41.667    |

BLADE FLAP AT STA 205  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 Y 405 CTR 252 FLT 500.0 TR 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.8592257E 04 |                |               |         |         |          |    |           |
| -0.3215447E 04 | 0.5100703E 04  | 0.6027613E 04 | 122.227 | 122.227 | 1.000000 | 1  | 4.167     |
| 0.2010450E 04  | -0.2041161E 04 | 0.3733440E 04 | 314.194 | 157.097 | 0.622502 | 2  | 8.333     |
| -0.3211107E 04 | -0.1506805E 04 | 0.3547913E 04 | 205.167 | 68.384  | 0.588415 | 3  | 12.500    |
| 0.5692468E 03  | 0.1765985E 03  | 0.3999240E 03 | 17.516  | 4.379   | 0.098999 | 4  | 16.667    |
| -0.2491849E 03 | -0.1332441E 03 | 0.2825713E 03 | 208.134 | 41.627  | 0.046864 | 5  | 20.833    |
| -0.2760548E 03 | 0.6755494E 02  | 0.2647843E 03 | 166.277 | 27.713  | 0.047231 | 6  | 25.000    |
| 0.1928215E 03  | -0.2743931E 03 | 0.3353677E 03 | 305.076 | 43.585  | 0.055620 | 7  | 29.167    |
| 0.1869498E 03  | -0.6650747E 02 | 0.1492440E 03 | 339.767 | 42.471  | 0.033044 | 8  | 33.333    |
| 0.1847515E 03  | 0.3475045E 02  | 0.1493003E 03 | 11.824  | 1.314   | 0.032160 | 9  | 37.500    |
| 0.1492310E 03  | -0.1865229E 03 | 0.2265641E 03 | 304.430 | 30.443  | 0.037907 | 10 | 41.667    |

# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 26 V= 173 KTS n= 1.15 g**

**BLADE FLAP AT STA 235**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1000 T 405 CTR 252 FLT 500.0 TR 4

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.250650E 04  | 0.3187449E 04  | 0.3330559E 04 | 105.043 | 105.043 | 0.903922 | 1  | 4.167     |
| -0.0500531E 04 | -0.7724102E 03 | 0.2131337E 04 | 340.340 | 170.195 | 0.630321 | 2  | 8.333     |
| 0.2100054E 04  | -0.1022270E 04 | 0.3601375E 04 | 196.250 | 65.419  | 1.000000 | 3  | 12.500    |
| -0.3372130E 03 | -0.1913425E 03 | 0.3477175E 03 | 330.420 | 82.007  | 0.106184 | 4  | 16.667    |
| -0.3572205E 03 | -0.1029642E 03 | 0.5006543E 03 | 190.470 | 30.094  | 0.155189 | 5  | 20.833    |
| -0.0094902E 03 | 0.0474840E 03  | 0.3972240E 03 | 133.208 | 22.211  | 0.243531 | 6  | 25.000    |
| -0.7010190E 03 | -0.1810880E 03 | 0.7240310E 03 | 194.404 | 27.783  | 0.193290 | 7  | 29.167    |
| -0.2330534E 02 | -0.4417932E 03 | 0.4023811E 03 | 267.171 | 33.390  | 0.132109 | 8  | 33.333    |
| 0.0708120E 01  | -0.1318505E 03 | 0.1320274E 03 | 272.912 | 30.324  | 0.036156 | 9  | 37.500    |
| -0.1318222E 03 | -0.3777107E 02 | 0.1307333E 03 | 190.011 | 19.601  | 0.037503 | 10 | 41.667    |

**BLADE FLAP AT STA 270**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1000 T 405 CTR 252 FLT 500.0 TR 26

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.1342544E 04 | 0.1302363E 03  | 0.1041546E 04 | 7.627   | 7.627  | 0.342541 | 1  | 4.167     |
| 0.1032383E 04  | 0.3709570E 03  | 0.1678514E 04 | 19.929  | 9.965  | 0.550577 | 2  | 8.333     |
| 0.1500002E 04  | -0.5942971E 03 | 0.3040794E 04 | 191.271 | 63.757 | 1.000000 | 3  | 12.500    |
| -0.2165179E 03 | -0.1022844E 03 | 0.2394621E 03 | 203.206 | 51.322 | 0.078750 | 4  | 16.667    |
| -0.2044601E 03 | -0.4787791E 03 | 0.5234130E 03 | 240.023 | 49.365 | 0.171275 | 5  | 20.833    |
| -0.4100215E 03 | 0.5413931E 03  | 0.0741303E 03 | 127.138 | 21.190 | 0.223341 | 6  | 25.000    |
| -0.7451262E 03 | -0.2178275E 03 | 0.9244233E 03 | 195.320 | 27.903 | 0.271121 | 7  | 29.167    |
| -0.3595741E 03 | -0.7028767E 03 | 0.7395142E 03 | 242.906 | 30.363 | 0.259641 | 8  | 33.333    |
| -0.1563445E 03 | -0.4714729E 03 | 0.4707145E 03 | 251.054 | 27.962 | 0.163352 | 9  | 37.500    |
| -0.1590322E 03 | -0.1130901E 03 | 0.1493140E 03 | 215.419 | 21.342 | 0.064176 | 10 | 41.667    |

**BLADE CHORD AT STA 103**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1000 T 405 CTR 252 FLT 500.0 TR 17

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2057511E 06  | 0.5040607E 05  | 0.3041009E 05 | 90.734  | 90.734 | 1.000000 | 1  | 4.167     |
| -0.7223370E 03 | 0.1913324E 03  | 0.7330392E 04 | 1.490   | 1.490  | 0.130400 | 2  | 8.333     |
| 0.7333530E 04  | -0.9334520E 04 | 0.1271157E 05 | 227.277 | 73.759 | 0.225340 | 3  | 12.500    |
| -0.0024152E 04 | -0.1650102E 04 | 0.3000138E 04 | 343.663 | 85.916 | 0.103991 | 4  | 16.667    |
| 0.0045472E 03  | -0.3702220E 03 | 0.9610122E 03 | 330.792 | 67.358 | 0.016081 | 5  | 20.833    |
| -0.2820455E 03 | -0.5280414E 03 | 0.2775525E 03 | 241.851 | 40.309 | 0.010628 | 6  | 25.000    |
| -0.0012424E 03 | -0.1409840E 04 | 0.1033202E 04 | 245.627 | 35.361 | 0.029041 | 7  | 29.167    |
| 0.0077777E 02  | -0.1319173E 04 | 0.1323572E 04 | 272.638 | 34.080 | 0.023410 | 8  | 33.333    |
| 0.5258436E 03  | 0.4093853E 03  | 0.7212712E 03 | 42.727  | 4.747  | 0.012706 | 9  | 37.500    |
| -0.4403200E 03 | 0.3255656E 03  | 0.5335723E 03 | 146.737 | 14.674 | 0.010522 | 10 | 41.667    |

**BLADE CHORD AT STA 235**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1000 T 405 CTR 252 FLT 500.0 TR 22

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2760600E 05 | 0.0051859E 04  | 0.4091807E 04 | 89.920  | 89.920  | 1.000000 | 1  | 4.167     |
| 0.1233512E 02  | -0.1402059E 03 | 0.1425764E 04 | 354.353 | 177.177 | 0.100343 | 2  | 8.333     |
| 0.1418540E 04  | -0.1321123E 04 | 0.2002084E 04 | 204.503 | 69.834  | 0.301701 | 3  | 12.500    |
| -0.2334529E 04 | -0.5533707E 03 | 0.1923507E 04 | 343.544 | 85.886  | 0.219696 | 4  | 16.667    |
| 0.1073490E 04  | -0.2000305E 03 | 0.2131003E 03 | 254.738 | 50.788  | 0.023996 | 5  | 20.833    |
| -0.5044493E 02 | -0.1444687E 03 | 0.2513213E 03 | 324.853 | 54.142  | 0.028320 | 6  | 25.000    |
| 0.2059100E 03  | -0.2371730E 03 | 0.7474480E 03 | 198.449 | 29.350  | 0.084285 | 7  | 29.167    |
| -0.7104244E 03 | -0.0210002E 03 | 0.7213740E 03 | 300.511 | 37.904  | 0.081150 | 8  | 33.333    |
| 0.3003434E 03  | -0.1143355E 03 | 0.3338003E 03 | 17.407  | 1.943   | 0.044850 | 9  | 37.500    |
| 0.1250700E 03  | -0.0551000E 02 | 0.1517372E 03 | 325.513 | 32.551  | 0.017065 | 10 | 41.667    |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 26 V= 173 KTS n= 1.15 g

BLADE TORSION AT STA 131.5  
HARMONIC ANALYSIS MODEL AM-50A SHIP LOG: T 405 CTR 252 FLT 500.0 TR 44

| AJ          |    | Bj          |    | Cj         |    | PHJC    | PSJC   | CJ/CJMAX | J  | FREQUENCY |
|-------------|----|-------------|----|------------|----|---------|--------|----------|----|-----------|
| 0.5734316F  | 03 |             |    |            |    |         |        |          |    |           |
| 0.2478802E  | 04 | 0.2237938F  | C4 | 0.3725640E | 04 | 36.919  | 36.919 | 1.000000 | 1  | 4.167     |
| -0.1801494F | 04 | 0.2025744F  | 04 | 0.2710937E | 04 | 131.646 | 65.823 | 0.727642 | 2  | 8.333     |
| -0.2383427F | 03 | 0.2368500E  | 03 | 0.3383137E | 03 | 135.180 | 45.060 | 0.090189 | 3  | 12.500    |
| -0.1473597F | 03 | -0.2059150E | C3 | 0.2532334E | 03 | 244.404 | 50.601 | 0.067970 | 4  | 16.667    |
| 0.7783826E  | 03 | -0.9523112E | C2 | 0.7441460E | 03 | 353.025 | 70.605 | 0.210483 | 5  | 20.833    |
| 0.2967502F  | 03 | -0.4701033E | 03 | 0.5520024E | 03 | 302.218 | 51.370 | 0.149145 | 6  | 25.000    |
| -0.5383806F | 03 | 0.2803237E  | 03 | 0.6004615E | 03 | 152.445 | 21.785 | 0.162922 | 7  | 29.167    |
| 0.2081555E  | 03 | -0.3786014F | 03 | 0.4323513E | 03 | 292.802 | 37.350 | 0.115967 | 8  | 33.333    |
| 0.6231696E  | 01 | -0.5252306E | C2 | 0.5287145E | 02 | 276.700 | 30.752 | 0.014197 | 9  | 37.500    |
| 0.4027746F  | 02 | -0.4485367E | C2 | 0.103511E  | 03 | 293.008 | 29.301 | 0.027160 | 10 | 41.667    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 27 V= 173.5 KTS n= 1.22 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-504 SHIP 1003 T 405 CTR 250 FLT 500.0 TR 41

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.6444024F 01  |                |               |         |         |          | 1  | 4.132     |
| 0.4257663F 01  | -0.4441702F C1 | 0.6081094F 01 | 314.441 | 314.441 | 1.000000 | 1  | 4.132     |
| -0.3174417F 00 | -0.4949007F 00 | 0.433310E 00  | 222.898 | 111.449 | 0.071259 | 2  | 8.264     |
| -0.6941744F 01 | 0.3333526E C1  | 0.775761E 01  | 154.509 | 51.503  | 0.012737 | 3  | 12.397    |
| -0.6947353F 02 | 0.1425717F 02  | 0.713127E 02  | 108.468 | 42.117  | 0.001173 | 4  | 16.529    |
| 0.2725433F 01  | 0.4254155E 02  | 0.2758433F 01 | 4.872   | 1.774   | 0.004536 | 5  | 20.661    |
| -0.2184442F 01 | 0.2967577F 01  | 0.3647711E 01 | 126.418 | 21.070  | 0.006064 | 6  | 24.793    |
| 0.5195469F 03  | 0.1016259E C1  | 0.1317587E 01 | 87.073  | 12.439  | 0.001673 | 7  | 28.926    |
| -0.9354722F 02 | 0.6753237F 03  | 0.379333E 02  | 175.847 | 21.981  | 0.001542 | 8  | 33.058    |
| -0.2252724F 02 | 0.8603133E C2  | 0.3893191E 02 | 104.673 | 11.630  | 0.001462 | 9  | 37.190    |
| 0.1067251F 01  | -0.8651718F C2 | 0.137311E 01  | 320.971 | 32.097  | 0.002259 | 10 | 41.322    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-504 SHIP 1003 T 405 CTR 250 FLT 500.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.7936244F 04 |                |               |         |         |          | 1  | 4.132     |
| -0.6937731F 03 | 0.1119656F C0  | 0.1317810E 00 | 121.968 | 121.968 | 1.000000 | 1  | 4.132     |
| -0.8940560E 03 | -0.1943792F C4 | 0.2135404F 04 | 245.542 | 122.771 | 0.016180 | 2  | 8.264     |
| 0.1134246E 04  | -0.2769559F 05 | 0.2771641E 05 | 272.345 | 90.782  | 0.210020 | 3  | 12.397    |
| -0.1206139F 04 | 0.1865113E 04  | 0.2173992E 04 | 123.750 | 30.933  | 0.016449 | 4  | 16.529    |
| 0.3594171E 04  | 0.2775174F 04  | 0.4340387E 04 | 37.673  | 7.335   | 0.034405 | 5  | 20.661    |
| -0.3633364E 03 | -0.4182466E C3 | 0.5540243E 03 | 229.019 | 38.170  | 0.004198 | 6  | 24.793    |
| -0.3118185F 04 | -0.1110881E 04 | 0.3313150F 04 | 197.609 | 28.316  | 0.025040 | 7  | 28.926    |
| 0.3355452E 02  | 0.4709968F 03  | 0.4725723E 03 | 85.320  | 10.665  | 0.003581 | 8  | 33.058    |
| -0.1140650E 04 | -0.7544005E 03 | 0.1367738E 04 | 213.474 | 23.719  | 0.010363 | 9  | 37.190    |
| 0.2266430F 03  | 0.5109049F 03  | 0.3549707E 03 | 66.080  | 6.608   | 0.004235 | 10 | 41.322    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-504 SHIP 1003 T 405 CTR 250 FLT 500.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2984250F C3 |                |               |         |         |          | 1  | 4.132     |
| -0.3023792F 03 | -0.5471945F 02 | 0.3104672E 03 | 197.393 | 197.393 | 0.677658 | 1  | 4.132     |
| 0.3304250E 03  | -0.3247422F 03 | 0.4073716E 03 | 316.012 | 158.006 | 1.000000 | 2  | 8.264     |
| 0.1141584F 01  | -0.2298926E C3 | 0.2298926E 03 | 270.234 | 90.095  | 0.491659 | 3  | 12.397    |
| -0.6706010F 02 | -0.4545089E C2 | 0.8332333E 02 | 216.410 | 54.102  | 0.178203 | 4  | 16.529    |
| -0.3315410F 02 | 0.9501342F C0  | 0.3107103E 02 | 178.197 | 35.639  | 0.067306 | 5  | 20.661    |
| -0.4450433F 02 | 0.5338543E C2  | 0.7337372E 02 | 133.070 | 22.178  | 0.156287 | 6  | 24.793    |
| -0.1083733F 02 | -0.1916930E 02 | 0.2232113E 02 | 243.519 | 34.360  | 0.047095 | 7  | 28.926    |
| 0.1038404F 02  | -0.2564967F 02 | 0.3101747E 02 | 283.302 | 36.163  | 0.067186 | 8  | 33.058    |
| -0.2167187F 01 | 0.2363573F C2  | 0.2373480E 02 | 95.239  | 10.582  | 0.050760 | 9  | 37.190    |
| 0.1134718F C2  | 0.8703196F 01  | 0.1450033E 02 | 37.488  | 3.749   | 0.030583 | 10 | 41.322    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-504 SHIP 1004 T 405 CTR 250 FLT 500.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.9944770F 04 |                |               |         |         |          | 1  | 4.132     |
| -0.6716844F 04 | 0.2854263E 05  | 0.2932233E 05 | 103.242 | 103.242 | 1.000000 | 1  | 4.132     |
| 0.2146500E 04  | -0.2051504E C5 | 0.2303233E 05 | 275.979 | 137.989 | 0.703630 | 2  | 8.264     |
| -0.2939224F 03 | -0.6387207E C4 | 0.6373405E 04 | 267.365 | 89.122  | 0.218058 | 3  | 12.397    |
| -0.1933444F 04 | -0.1093633E 04 | 0.2238919F 04 | 209.240 | 52.310  | 0.076355 | 4  | 16.529    |
| 0.1602030E 04  | -0.3815321E 01 | 0.1632043E 04 | 359.792 | 71.958  | 0.054636 | 5  | 20.661    |
| 0.7983540F 03  | -0.7092345E C2 | 0.4015331E 03 | 354.924 | 59.154  | 0.027335 | 6  | 24.793    |
| -0.1090771E 04 | 0.3571653E C3  | 0.1166407E 04 | 180.094 | 22.871  | 0.034781 | 7  | 28.926    |
| 0.3616526E 03  | -0.7764219E C3 | 0.3553524E 03 | 244.476 | 36.872  | 0.024211 | 8  | 33.058    |
| -0.1332294E 03 | -0.2156704F C2 | 0.1319733E 03 | 189.378 | 21.042  | 0.004501 | 9  | 37.190    |
| 0.2281414F 03  | 0.2581247E C3  | 0.3444783E 03 | 48.529  | 4.853   | 0.011749 | 10 | 41.322    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 27 V= 173.5 KTS n= 1.22 g

FIXED HUB CHORD AT STA 18

MAKROVIC ANALYSIS MODEL AM-50A SHIP 1009 T 405 CTR 256 FLT 500.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.524780VF U3  |                |               |         |        |          | 1  | 4.132     |
| 0.1039913F U3  | 0.1064903F C6  | 0.1335371E C6 | 80.240  | 80.240 | 1.000000 | 2  | 8.264     |
| 0.9211852F U4  | 0.4852980E C4  | 0.1032323E U3 | 26.799  | 13.399 | 0.095085 | 3  | 12.397    |
| -0.1154471E U3 | -0.1728818F C5 | 0.2041553E U5 | 236.151 | 78.717 | 0.191790 | 4  | 16.525    |
| 0.8550759F U3  | 0.2602477E U4  | 0.2743351E C4 | 71.811  | 17.453 | 0.025239 | 5  | 20.661    |
| 0.2280707E U4  | 0.2064293F C4  | 0.3375147E C4 | 42.149  | 8.430  | 0.028342 | 6  | 24.793    |
| 0.1243240E U4  | -0.1504357E C4 | 0.1351533E C4 | 309.571 | 51.595 | 0.017481 | 7  | 28.926    |
| 0.1450732F U4  | -0.4405153E C2 | 0.1851250E U4 | 358.636 | 51.234 | 0.017056 | 8  | 33.058    |
| -0.4255150E U3 | 0.4530646E C3  | 0.1333402E U4 | 155.417 | 19.240 | 0.004494 | 9  | 37.190    |
| -0.1110803F U4 | 0.4350883E C2  | 0.1114730E U4 | 175.185 | 19.465 | 0.010271 | 10 | 41.322    |
| 0.4075208F U3  | -0.3308308E U3 | 0.1057415E U3 | 334.471 | 33.997 | 0.004900 |    |           |

BLADE FLAP AT STA 130.3

MAKROVIC ANALYSIS MODEL AM-50A SHIP 1009 T 405 CTR 256 FLT 500.0 TR 19

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1037550E C5  |                |               |         |         |          | 1  | 4.132     |
| 0.5140483F U4  | -0.2754654E C4 | 0.3873357E C4 | 331.886 | 331.886 | 0.934619 | 2  | 8.264     |
| -0.2767512E U4 | 0.5654023F U4  | 0.6308303F U4 | 116.224 | 58.112  | 1.000000 | 3  | 12.397    |
| 0.6443391F C2  | 0.1662700E U4  | 0.1634209E U4 | 87.609  | 29.203  | 0.263812 | 4  | 16.525    |
| 0.8544007F U3  | 0.2352937E C3  | 0.6417671E C3 | 15.339  | 3.835   | 0.141361 | 5  | 20.661    |
| -0.6219550F U3 | 0.1544488E C2  | 0.6221423E C3 | 178.596 | 35.713  | 0.048623 | 6  | 24.793    |
| -0.5603588F U3 | 0.4777422E C3  | 0.7355442E U3 | 134.562 | 23.260  | 0.116758 | 7  | 28.926    |
| -0.4755760F U2 | -0.3775442E C3 | 0.3313443E U3 | 255.512 | 36.502  | 0.061814 | 8  | 33.058    |
| 0.4366873F C3  | -0.8512749E C2 | 0.4449072E C3 | 348.469 | 43.621  | 0.070527 | 9  | 37.190    |
| -0.3151584F C3 | -0.1164709F C3 | 0.1337713E C3 | 209.834 | 23.982  | 0.017274 | 10 | 41.322    |
| 0.2423550F U3  | -0.7304441F C2 | 0.2531632E C3 | 343.229 | 34.323  | 0.040132 |    |           |

BLADE FLAP AT STA 174

MAKROVIC ANALYSIS MODEL AM-50A SHIP 1009 T 405 CTR 256 FLT 500.0 TR 30

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1037455F U4  |                |               |         |         |          | 1  | 4.132     |
| 0.4623742F C4  | -0.5021359E C4 | 0.6825910E U4 | 312.639 | 312.639 | 1.000000 | 2  | 8.264     |
| -0.2725497F U4 | 0.4789598E C5  | 0.5510663E C4 | 119.640 | 59.820  | 0.807316 | 3  | 12.397    |
| 0.1545147F U4  | 0.1553534E C4  | 0.2213492E C4 | 44.423  | 14.808  | 0.325157 | 4  | 16.525    |
| -0.5258884F C3 | -0.5686631E C3 | 0.7755537E C3 | 227.238 | 56.309  | 0.113473 | 5  | 20.661    |
| -0.4912401E U2 | 0.1388637F C3  | 0.1677593F C3 | 124.151 | 24.826  | 0.024577 | 6  | 24.793    |
| -0.1970220E C3 | 0.7294357E C2  | 0.2114733E C3 | 159.872 | 26.645  | 0.031054 | 7  | 28.926    |
| -0.8363330E U3 | 0.3641210F C2  | 0.4371523E C3 | 177.414 | 25.345  | 0.118248 | 8  | 33.058    |
| 0.4646457E U2  | -0.4311831E C3 | 0.4338814E C3 | 276.153 | 34.519  | 0.063535 | 9  | 37.190    |
| -0.2647463F U3 | -0.2618555E C3 | 0.3329237E C3 | 217.324 | 24.147  | 0.048773 | 10 | 41.322    |
| -0.2124248F U3 | -0.1724475E C3 | 0.2736077E C3 | 219.070 | 21.907  | 0.040084 |    |           |

BLADE FLAP AT STA 205

MAKROVIC ANALYSIS MODEL AM-50A SHIP 1009 T 405 CTR 256 FLT 500.0 TR 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.8354888E U4 |                |               |         |         |          | 1  | 4.132     |
| -0.3470251F U4 | 0.5215043E C4  | 0.6254152E C4 | 123.641 | 123.641 | 1.000000 | 2  | 8.264     |
| 0.2575166F U4  | -0.2332459E C4 | 0.3475710F U4 | 317.850 | 158.925 | 0.554858 | 3  | 12.397    |
| -0.3378936F U4 | -0.1708464E C4 | 0.3519839E U4 | 209.000 | 63.667  | 0.561905 | 4  | 16.525    |
| 0.5397625F U3  | 0.2537950E C3  | 0.6312532E C3 | 22.936  | 5.734   | 0.103965 | 5  | 20.661    |
| -0.1832427F C3 | -0.2470972E C3 | 0.3522600E C3 | 237.501 | 47.503  | 0.056234 | 6  | 24.793    |
| -0.1768677E C3 | 0.5314447E C2  | 0.1340735E C3 | 163.276 | 27.213  | 0.024482 | 7  | 28.926    |
| 0.4156210F U3  | -0.1616655E C3 | 0.4278752E C3 | 46.255  | 49.465  | 0.068305 | 8  | 33.058    |
| 0.2793811F U3  | 0.1435930E C3  | 0.3141221E C3 | 27.202  | 3.400   | 0.050146 | 9  | 37.190    |
| 0.1362770F C3  | 0.1040353E C3  | 0.1714435E U3 | 37.358  | 4.151   | 0.027370 | 10 | 41.322    |
| 0.1220279F U3  | -0.3254811E C2 | 0.1252935E U3 | 345.065 | 34.507  | 0.020161 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 27 V= 173.5 KTS n= 1.22 g

## BLADE FLAP AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1307 T 405 CTR 256 FLT 500.0 TR 4

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2224743F 04 |                |               |         |         |          | 1  | 4.132     |
| -0.7097415C 03 | 0.3435232E 04  | 0.3520425E 04 | 102.631 | 102.631 | 0.921437 | 2  | 8.264     |
| 0.1954780F 04  | -0.4367954C 03 | 0.2332332E 04 | 347.404 | 173.702 | 0.526264 | 3  | 12.397    |
| -0.3086422F 04 | -0.1004298E 04 | 0.3823332E 04 | 195.200 | 65.080  | 1.000000 | 4  | 16.525    |
| 0.4534376E 03  | -0.1480423E 03 | 0.4775730E 03 | 341.859 | 85.465  | 0.125001 | 5  | 20.661    |
| -0.4480315F 03 | -0.1762993F 03 | 0.4822333E 03 | 201.701 | 43.340  | 0.126213 | 6  | 24.793    |
| -0.4561423E 03 | 0.6554990E 03  | 0.4018737E 03 | 144.670 | 20.774  | 0.209883 | 7  | 28.926    |
| -0.5493784F 03 | -0.2219200E 03 | 0.6331423E 03 | 200.317 | 46.617  | 0.167289 | 8  | 33.058    |
| 0.3409337E 02  | -0.2667544E 03 | 0.2670633E 03 | 278.337 | 34.792  | 0.070566 | 9  | 37.190    |
| -0.7832085F 02 | -0.1850540C 03 | 0.2014737E 03 | 247.127 | 27.459  | 0.052740 | 10 | 41.322    |
| -0.4589084F 02 | 0.1108149C 03  | 0.1405435E 03 | 130.870 | 13.087  | 0.038356 |    |           |

## BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AM-56A SHIP 1307 T 405 CTR 256 FLT 500.0 TR 26

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.2105223F 04 |                |               |         |        |          | 1  | 4.132     |
| 0.1725340E 04  | 0.1715342E 04  | 0.2432372E 04 | 44.833  | 44.833 | 0.880368 | 2  | 8.264     |
| 0.1366615E 04  | 0.1081177E 04  | 0.1742104E 04 | 38.361  | 19.180 | 0.630380 | 3  | 12.397    |
| -0.2015871F 04 | -0.0514115E 03 | 0.2703534E 04 | 198.818 | 66.273 | 1.000000 | 4  | 16.525    |
| -0.7317262E 02 | -0.3336624E 03 | 0.3426475E 03 | 250.814 | 64.203 | 0.124005 | 5  | 20.661    |
| -0.1149513C 03 | -0.4540317E 03 | 0.3077615E 03 | 250.084 | 51.217 | 0.169259 | 6  | 24.793    |
| -0.4077725F 03 | 0.3413143E 03  | 0.3953325E 03 | 145.018 | 24.173 | 0.215420 | 7  | 28.926    |
| -0.6627545F 03 | -0.4042439E 03 | 0.3071804E 03 | 215.310 | 33.716 | 0.242801 | 8  | 33.058    |
| 0.716754E 02   | -0.0740914E 03 | 0.6333907E 03 | 275.409 | 34.496 | 0.247286 | 9  | 37.190    |
| -0.7613042F 02 | -0.4047617E 03 | 0.4734335E 03 | 260.097 | 28.966 | 0.170415 | 10 | 41.322    |
| -0.4740071E 02 | -0.6016200E 02 | 0.7693204E 02 | 231.474 | 23.147 | 0.027827 |    |           |

## BLADE CHORD AT STA 103

HARMONIC ANALYSIS MODEL AM-56A SHIP 1307 T 405 CTR 256 FLT 500.0 TR 17

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2347570E 06  |                |               |         |        |          | 1  | 4.132     |
| 0.2332714E 04  | 0.5241644E 05  | 0.5249343E 05 | 86.907  | 86.907 | 1.000000 | 2  | 8.264     |
| 0.6400422E 04  | 0.7680128E 03  | 0.6446400E 04 | 6.848   | 3.424  | 0.122804 | 3  | 12.397    |
| -0.7953340E 04 | -0.1038453E 03 | 0.1338426E 05 | 232.565 | 77.522 | 0.249255 | 4  | 16.525    |
| 0.5127164E 04  | -0.5415949E 03 | 0.5416944E 04 | 349.560 | 87.390 | 0.103191 | 5  | 20.661    |
| 0.1314745E 03  | -0.2478174E 03 | 0.1059334E 04 | 344.235 | 63.847 | 0.020185 | 6  | 24.793    |
| 0.3753510F 03  | -0.5338821E 02 | 0.3732712E 03 | 351.755 | 53.026 | 0.007225 | 7  | 28.926    |
| -0.1397144E 04 | -0.5740475E 03 | 0.1733432E 04 | 215.010 | 30.716 | 0.032496 | 8  | 33.058    |
| 0.2111727E 03  | -0.1025806E 03 | 0.3243972E 03 | 284.741 | 25.593 | 0.015810 | 9  | 37.190    |
| 0.6773500E 03  | -0.3252447E 02 | 0.5731533E 03 | 337.217 | 33.691 | 0.012919 | 10 | 41.322    |
| -0.4636390E 03 | 0.1110825E 03  | 0.4707613E 03 | 166.527 | 16.653 | 0.009082 |    |           |

## BLADE CHORD AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1307 T 405 CTR 256 FLT 500.0 TR 22

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.2736084E 05 |                |               |         |        |          | 1  | 4.132     |
| 0.9729025F 02  | 0.8567277E 04  | 0.4526784E 04 | 89.349  | 89.349 | 1.000000 | 2  | 8.264     |
| 0.1086950F 02  | 0.3240257E 03  | 0.1717477E 04 | 13.849  | 5.449  | 0.200514 | 3  | 12.397    |
| -0.1814003F 04 | -0.1403265E 04 | 0.2333013E 04 | 218.891 | 72.964 | 0.272018 | 4  | 16.525    |
| 0.1966542F 04  | -0.3573138E 02 | 0.1450607E 04 | 355.959 | 87.740 | 0.224564 | 5  | 20.661    |
| -0.1395690F 03 | -0.2626128E 03 | 0.2174033E 03 | 242.008 | 44.402 | 0.034712 | 6  | 24.793    |
| -0.1070185C 02 | -0.2143566E 03 | 0.2235934E 03 | 265.637 | 44.273 | 0.025747 | 7  | 28.926    |
| -0.7204142F 03 | -0.5660142E 03 | 0.4333251E 03 | 218.894 | 31.271 | 0.104934 | 8  | 33.058    |
| 0.4306621E 03  | -0.5450276E 03 | 0.6735313E 03 | 303.714 | 33.589 | 0.081526 | 9  | 37.190    |
| 0.3444710E 03  | 0.7083536E 02  | 0.3520311E 03 | 11.015  | 1.291  | 0.041093 | 10 | 41.322    |
| -0.3661414E 02 | -0.7779004E 02 | 0.0537603E 02 | 244.745 | 24.474 | 0.010035 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 27 V= 173.5 KTS n= 1.22 g

BLADE TORSION AT STA 131.5  
HARMONIC ANALYSIS MODEL AM-36A SHIP 1004 T 405 CTR 250 FLT 500.0 TR 44

| AJ             | BJ             | CJ            | PHJC    | PTJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.4970190E J3  |                |               |         |        |          |    |           |
| 0.2473020E 04  | 0.2635818E 04  | 0.3097325E 04 | 42.556  | 42.556 | 1.000000 | 1  | 4.132     |
| -0.2195650E 04 | 0.1927777E 04  | 0.2921885E 04 | 138.718 | 69.359 | 0.749715 | 2  | 8.264     |
| -0.2177677E J3 | 0.1083673E 03  | 0.2432411E 03 | 153.544 | 51.181 | 0.062412 | 3  | 12.397    |
| J.5824C95E 02  | -0.4C77959E 03 | 0.4119433E 03 | 278.135 | 69.534 | 0.105698 | 4  | 16.525    |
| 0.7046C33E J3  | -0.5284257E 01 | 0.7000210E 03 | 359.004 | 71.921 | 0.196191 | 5  | 20.661    |
| 0.3749500E 03  | -0.4627954E 03 | 0.5987236E 03 | 309.379 | 51.563 | 0.153624 | 6  | 24.793    |
| -0.5705247E 03 | -0.5014067E 02 | 0.5732903E 03 | 185.620 | 20.517 | 0.147098 | 7  | 28.926    |
| J.3543650E 03  | -0.2552664E 02 | 0.3552833E 03 | 355.880 | 44.485 | 0.091161 | 8  | 33.058    |
| -0.1932285E 02 | 0.4881384E 02  | 0.3243913E 02 | 111.596 | 12.400 | 0.013471 | 9  | 37.190    |
| 0.6622080E 02  | -0.1504583E 02 | 0.3830333E 02 | 346.543 | 34.654 | 0.017471 | 10 | 41.322    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 28 V= 173 KTS n= 1.45 g

BLADE FEATHER ANGLE  
HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 405 CTR 301 FLT 500.0 TR 31

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.00812002 J1  |                |               |         |         |          |    |           |
| 0.4740455F J1  | -0.4633243F 01 | 0.0023073F 01 | 315.655 | 315.655 | 1.000000 | 1  | 4.115     |
| -0.2570517F 00 | -0.4159533F 00 | 0.4341923F 00 | 238.205 | 119.102 | 0.073830 | 2  | 8.230     |
| -0.0345343F 01 | -0.0000651F 02 | 0.0071659F 01 | 185.016 | 61.672  | 0.010367 | 3  | 12.346    |
| -0.3130511F 01 | 0.3324992F 01  | 0.4330534F 01 | 133.457 | 33.364  | 0.006910 | 4  | 16.461    |
| 0.2304403F 01  | 0.2478701F 01  | 0.3425555F 01 | 46.352  | 9.270   | 0.005168 | 5  | 20.576    |
| -0.1472261F 01 | 0.2342200F 01  | 0.2765444F 01 | 122.153 | 20.359  | 0.004174 | 6  | 24.691    |
| 0.3550421F 01  | 0.1387910F 01  | 0.3812057F 01 | 21.351  | 3.050   | 0.003751 | 7  | 28.807    |
| -0.0940296F 03 | -0.1385536F 01 | 0.1319107F 01 | 265.887 | 33.236  | 0.002096 | 8  | 32.922    |
| 0.1150290F 01  | 0.4189610F 02  | 0.1259337F 01 | 17.402  | 2.140   | 0.001916 | 9  | 37.037    |
| -0.4457438F 02 | -0.1318105F 01 | 0.1406334F 01 | 249.339 | 24.939  | 0.002125 | 10 | 41.152    |

SHAFT MOMENT  
HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 405 CTR 301 FLT 500.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.0030281F 04 |                |               |         |         |          |    |           |
| -0.0723275F 05 | 0.1121558F 06  | 0.1420861F 06 | 127.875 | 127.875 | 1.000000 | 1  | 4.115     |
| -0.1132255F 04 | -0.1653205F 04 | 0.2033994F 04 | 235.584 | 117.792 | 0.014104 | 2  | 8.230     |
| -0.0640285F 04 | -0.3040536F 05 | 0.3114479F 05 | 257.490 | 85.830  | 0.219196 | 3  | 12.346    |
| 0.2880369F 03  | -0.2608174F 03 | 0.3370350F 03 | 317.640 | 79.410  | 0.002724 | 4  | 16.461    |
| -0.3955665F 04 | -0.0623831F 03 | 0.4073091F 04 | 192.208 | 38.442  | 0.028702 | 5  | 20.576    |
| -0.2512491F 03 | -0.6378875F 03 | 0.6355852F 03 | 248.502 | 41.417  | 0.004825 | 6  | 24.691    |
| -0.4443253F 03 | -0.2224410F 04 | 0.3422537F 04 | 204.218 | 29.174  | 0.038164 | 7  | 28.807    |
| 0.4441570F 03  | -0.7157117F 03 | 0.4443753F 03 | 302.111 | 37.764  | 0.005947 | 8  | 32.922    |
| -0.1295760F 04 | -0.2213225F 03 | 0.1314525F 04 | 189.643 | 21.377  | 0.009252 | 9  | 37.037    |
| -0.5019324F 02 | 0.2031823F 03  | 0.2092932F 03 | 103.876 | 10.388  | 0.001473 | 10 | 41.152    |

PITCH LINK TENSION  
HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 405 CTR 301 FLT 500.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.3440137F 03 |                |               |         |         |          |    |           |
| -0.2154431F 03 | -0.2687402F 03 | 0.3447502F 03 | 231.217 | 231.217 | 0.704423 | 1  | 4.115     |
| 0.3059634F 03  | -0.3795388F 03 | 0.4634042F 03 | 309.149 | 154.574 | 1.000000 | 2  | 8.230     |
| -0.3644049F 02 | -0.2207195F 03 | 0.2237153F 03 | 260.612 | 86.871  | 0.457114 | 3  | 12.346    |
| -0.9734501F 02 | -0.4367320F 02 | 0.1006972F 03 | 204.162 | 51.041  | 0.218013 | 4  | 16.461    |
| -0.6702331F 02 | 0.2414140F 02  | 0.7130333F 02 | 163.353 | 32.371  | 0.146715 | 5  | 20.576    |
| -0.1710667F 02 | 0.4373181F 02  | 0.4045853F 02 | 111.364 | 18.561  | 0.095950 | 6  | 24.691    |
| 0.3369607F 02  | -0.2116711F 02 | 0.3723331F 02 | 325.413 | 46.488  | 0.076191 | 7  | 28.807    |
| 0.1163441F 02  | -0.2311703F 02 | 0.2547018F 02 | 297.109 | 37.139  | 0.053064 | 8  | 32.922    |
| 0.1033113F 02  | -0.1434439F 02 | 0.1707743F 02 | 305.762 | 33.974  | 0.030120 | 9  | 37.037    |
| -0.0774451F 01 | -0.1673550F 02 | 0.1803464F 02 | 247.902 | 24.796  | 0.036891 | 10 | 41.152    |

FIXED INB FLAP AT STA 18  
HARMONIC ANALYSIS MODEL AM-50A SHIP 1009 T 405 CTR 301 FLT 500.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1831544F 04  |                |               |         |         |          |    |           |
| -0.1234685F 05 | 0.2657463F 05  | 0.2940544F 05 | 114.922 | 114.922 | 1.000000 | 1  | 4.115     |
| 0.1595980F 04  | -0.2328376F 05 | 0.2333854F 05 | 273.921 | 136.961 | 0.798390 | 2  | 8.230     |
| 0.3057104F 03  | -0.6109240F 04 | 0.6115831F 04 | 272.655 | 93.955  | 0.208694 | 3  | 12.346    |
| -0.2502063F 04 | -0.7488223F 03 | 0.2611714F 04 | 150.861 | 49.165  | 0.089120 | 4  | 16.461    |
| -0.6492794F 02 | -0.7314525F 02 | 0.4734455F 02 | 228.425 | 45.685  | 0.003339 | 5  | 20.576    |
| -0.3067422F 03 | -0.1802911F 03 | 0.3558327F 03 | 210.445 | 35.074  | 0.012141 | 6  | 24.691    |
| -0.0424226F 03 | -0.3884468F 03 | 0.7537430F 03 | 211.159 | 30.166  | 0.025618 | 7  | 28.807    |
| 0.3330551F 03  | -0.3804707F 03 | 0.5036433F 03 | 310.942 | 38.868  | 0.017107 | 8  | 32.922    |
| 0.3710176F 03  | 0.2243291F 02  | 0.3716931F 03 | 31.460  | 0.384   | 0.012683 | 9  | 37.037    |
| 0.3084010F 03  | -0.7742393F 02 | 0.3130958F 03 | 345.820 | 34.582  | 0.010854 | 10 | 41.152    |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 28 V= 173 KTS n= 1.45 g

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 301 FLT 500.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.4776470F 05  |                |               |         |        |          | 1  | 4.115     |
| 0.5075310E 05  | 0.7824575E 05  | 0.9330650E 05 | 57.044  | 57.044 | 1.000000 | 2  | 8.230     |
| 0.1959170F 05  | 0.7119770E 04  | 0.2134835E 05 | 21.516  | 10.758 | 0.225585 | 3  | 12.346    |
| -0.4949552E 04 | -0.2350882E 05 | 0.2352770E 05 | 247.060 | 82.353 | 0.273590 | 4  | 16.461    |
| 0.1764680F 04  | 0.1036641E 04  | 0.2053231E 04 | 30.081  | 7.520  | 0.022166 | 5  | 20.576    |
| 0.1420547F 03  | 0.4021904E 03  | 0.3020805E 03 | 73.585  | 14.717 | 0.005387 | 6  | 24.691    |
| -0.2367360E 02 | -0.1614050E 04 | 0.1514224E 04 | 269.159 | 44.860 | 0.017300 | 7  | 28.807    |
| -0.1651235F 04 | 0.1713732F 04  | 0.2373873E 04 | 133.938 | 19.134 | 0.025506 | 8  | 32.922    |
| 0.5224065F 03  | -0.3907144E 03 | 0.6523542E 03 | 323.207 | 40.401 | 0.006992 | 9  | 37.037    |
| -0.4407420E 03 | 0.1117880F 04  | 0.1233843E 04 | 111.784 | 12.420 | 0.012902 | 10 | 41.152    |
| 0.2743150F 03  | 0.6264757E 02  | 0.2614203E 03 | 12.862  | 1.286  | 0.003016 |    |           |

BLADE FLAP AT STA 130.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 301 FLT 500.0 TR 19

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1152419F 05  |                |               |         |         |          | 1  | 4.115     |
| 0.5039600E 04  | -0.3374282E 04 | 0.6574594E 04 | 329.070 | 329.070 | 0.935804 | 2  | 8.230     |
| -0.2931104E 04 | 0.6384746E 04  | 0.7025613E 04 | 114.663 | 57.331  | 1.000000 | 3  | 12.346    |
| -0.1270021F 03 | 0.1853215E 04  | 0.1857502E 04 | 93.920  | 31.307  | 0.264398 | 4  | 16.461    |
| 0.1082141E 04  | 0.3609282E 02  | 0.1362742E 04 | 1.910   | 0.476   | 0.154114 | 5  | 20.576    |
| -0.2016195F 03 | 0.4000868E 01  | 0.2016532E 03 | 178.863 | 35.773  | 0.028703 | 6  | 24.691    |
| -0.1495126E 03 | 0.5267117F 03  | 0.5474453E 03 | 105.790 | 17.632  | 0.078206 | 7  | 28.807    |
| 0.2540544F 03  | -0.1564328F 03 | 0.3333434E 03 | 323.616 | 49.259  | 0.047455 | 8  | 32.922    |
| 0.3562910E 03  | -0.1238709E 03 | 0.3772097E 03 | 340.829 | 42.604  | 0.053691 | 9  | 37.037    |
| 0.1648257E 03  | -0.2531204E 03 | 0.3362313E 03 | 299.349 | 33.261  | 0.047866 | 10 | 41.152    |
| 0.1230564E 03  | -0.1599556F 03 | 0.2019135E 03 | 307.572 | 30.757  | 0.028725 |    |           |

BLADE FLAP AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 301 FLT 500.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1496552E 04  |                |               |         |         |          | 1  | 4.115     |
| 0.5081260F 04  | -0.3579570F 04 | 0.7346573E 04 | 312.324 | 312.324 | 1.000000 | 2  | 8.230     |
| -0.2528504E 04 | 0.6194000F 04  | 0.6690215E 04 | 112.206 | 56.103  | 0.886523 | 3  | 12.346    |
| 0.1117504F 04  | 0.1740984E 04  | 0.2368979E 04 | 57.295  | 19.098  | 0.274163 | 4  | 16.461    |
| -0.1121852E 04 | -0.2681685E 03 | 0.1134533E 04 | 193.444 | 48.361  | 0.152845 | 5  | 20.576    |
| -0.1033570E 04 | -0.4040430E 02 | 0.1333733E 04 | 182.268 | 36.454  | 0.136987 | 6  | 24.691    |
| -0.6467550E 03 | -0.2344055E 03 | 0.6239443E 03 | 199.664 | 33.311  | 0.051412 | 7  | 28.807    |
| -0.5328514E 03 | -0.1302399F 03 | 0.5174824E 03 | 194.520 | 27.788  | 0.068637 | 8  | 32.922    |
| 0.2634330F 03  | -0.1866655E 03 | 0.3234246E 03 | 324.369 | 40.546  | 0.042460 | 9  | 37.037    |
| 0.1637115E 02  | 0.4474829E 02  | 0.4764837E 02 | 69.905  | 7.767   | 0.006514 | 10 | 41.152    |
| 0.8601182F 02  | 0.530147E 02   | 0.1044527E 03 | 31.465  | 3.197   | 0.013841 |    |           |

BLADE FLAP AT STA 205

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 301 FLT 500.0 TR 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.7767574F 04 |                |               |         |         |          | 1  | 4.115     |
| -0.3776795F 04 | 0.5666446E 04  | 0.6977102E 04 | 122.773 | 122.773 | 1.000000 | 2  | 8.230     |
| 0.2848834F 04  | -0.3321654E 04 | 0.4375984E 04 | 310.618 | 155.309 | 0.627192 | 3  | 12.346    |
| -0.2620230F 04 | -0.1339401E 04 | 0.2942732E 04 | 207.076 | 69.025  | 0.421773 | 4  | 16.461    |
| 0.1354440F 04  | 0.3334138E 03  | 0.1110670E 04 | 17.469  | 4.367   | 0.159188 | 5  | 20.576    |
| 0.5010667F 03  | 0.4081501F 02  | 0.5625773E 03 | 4.161   | 0.832   | 0.080628 | 6  | 24.691    |
| 0.2665615E 03  | 0.2767021E 03  | 0.3842122E 03 | 46.069  | 7.678   | 0.055068 | 7  | 28.807    |
| 0.3918064E 03  | -0.2545714E 02 | 0.3929126E 03 | 355.700 | 50.814  | 0.056315 | 8  | 32.922    |
| 0.2572473E 03  | 0.5744032E 02  | 0.2635823E 03 | 12.587  | 1.573   | 0.037778 | 9  | 37.037    |
| 0.1699255E 03  | -0.5147607E 02 | 0.1423833E 03 | 331.705 | 36.856  | 0.027660 | 10 | 41.152    |
| 0.1298227E 03  | -0.5963356E 02 | 0.1631753E 03 | 322.529 | 32.253  | 0.023473 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 28 V= 173 KTS n= 1.45 g

BLADE FLAP AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1004 T 405 CTR 301 FLT 500.0 TR 4

| AJ             |    | BJ             |    | CJ            |    | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----|----------------|----|---------------|----|---------|---------|----------|----|-----------|
| -0.4463804E 03 | 03 |                |    |               |    |         |         |          |    |           |
| -0.1134717E 04 | 04 | 0.4037525E 04  | 04 | 0.4209163E 04 | 04 | 106.418 | 106.418 | 1.000000 | 1  | 4.115     |
| 0.2221525E 04  | 04 | -0.8319318E 03 | 03 | 0.2372593E 04 | 04 | 339.473 | 169.737 | 0.546673 | 2  | 8.230     |
| -0.3366064E 04 | 04 | -0.1263093E 04 | 04 | 0.3323746E 04 | 04 | 202.708 | 67.569  | 0.769646 | 3  | 12.346    |
| 0.7462366E 03  | 03 | -0.4021963E 03 | 03 | 0.8323313E 03 | 03 | 333.201 | 83.300  | 0.211931 | 4  | 16.461    |
| 0.1643420E 02  | 02 | -0.3444172E 03 | 03 | 0.3333633E 03 | 03 | 272.820 | 54.564  | 0.091439 | 5  | 20.576    |
| -0.7720117E 02 | 02 | 0.4887644E 03  | 03 | 0.4749365E 03 | 03 | 98.974  | 16.496  | 0.117586 | 6  | 24.691    |
| -0.2559426E 03 | 03 | -0.1956422E 03 | 03 | 0.3157727E 03 | 03 | 219.068 | 31.295  | 0.075258 | 7  | 28.807    |
| 0.4759949E 03  | 03 | -0.1346892E 02 | 02 | 0.4731373E 03 | 03 | 358.379 | 44.797  | 0.113132 | 8  | 32.922    |
| 0.1493151E 03  | 03 | -0.3025483E 03 | 03 | 0.3553914E 03 | 03 | 302.036 | 33.560  | 0.086791 | 9  | 37.037    |
| 0.9955503E 02  | 02 | 0.3442712E 02  | 02 | 0.1355066E 03 | 03 | 19.332  | 1.933   | 0.025066 | 10 | 41.152    |

BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AM-56A SHIP 1004 T 405 CTR 301 FLT 500.0 TR 26

| AJ             |    | BJ             |    | CJ            |    | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----|----------------|----|---------------|----|---------|--------|----------|----|-----------|
| 0.1434793E 04  | 04 |                |    |               |    |         |        |          |    |           |
| 0.1067631E 04  | 04 | 0.1146477E 04  | 04 | 0.1550067E 04 | 04 | 47.089  | 47.089 | 0.545671 | 1  | 4.115     |
| 0.1431452E 04  | 04 | 0.8468376E 03  | 03 | 0.2103126E 04 | 04 | 23.673  | 11.836 | 0.733954 | 2  | 8.230     |
| -0.2765760E 04 | 04 | -0.7799495E 03 | 03 | 0.2873649E 04 | 04 | 193.748 | 65.249 | 1.000000 | 3  | 12.346    |
| 0.2330127E 03  | 03 | -0.6557422E 03 | 03 | 0.0959114E 03 | 03 | 269.502 | 72.391 | 0.242170 | 4  | 16.461    |
| -0.4904723E 02 | 02 | -0.5303614E 03 | 03 | 0.5326244E 03 | 03 | 264.716 | 52.943 | 0.185348 | 5  | 20.576    |
| -0.7844254E 03 | 03 | 0.5611726E 02  | 02 | 0.7853744E 03 | 03 | 175.765 | 29.294 | 0.273859 | 6  | 24.691    |
| -0.5619104E 03 | 03 | -0.3729426E 03 | 03 | 0.6744104E 03 | 03 | 213.572 | 30.510 | 0.236688 | 7  | 28.807    |
| 0.1751636E 03  | 03 | -0.4616101E 03 | 03 | 0.5311714E 03 | 03 | 292.918 | 36.615 | 0.174402 | 8  | 32.922    |
| 0.6479647E 02  | 02 | -0.2183406E 03 | 03 | 0.2277504E 03 | 03 | 286.528 | 31.836 | 0.079255 | 9  | 37.037    |
| -0.4005659E 02 | 02 | 0.1689095E 03  | 03 | 0.1734974E 03 | 03 | 103.349 | 10.335 | 0.060375 | 10 | 41.152    |

BLADE CHORD AT STA 103

HARMONIC ANALYSIS MODEL AM-56A SHIP 1004 T 405 CTR 301 FLT 500.0 TR 17

| AJ             |    | BJ             |    | CJ            |    | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----|----------------|----|---------------|----|---------|--------|----------|----|-----------|
| 0.2363522E 06  | 06 |                |    |               |    |         |        |          |    |           |
| 0.1888130E 05  | 05 | 0.3877501E 05  | 05 | 0.4312777E 05 | 05 | 64.036  | 64.036 | 1.000000 | 1  | 4.115     |
| 0.1213373E 05  | 05 | 0.3441693E 04  | 04 | 0.1261233E 05 | 05 | 15.636  | 7.918  | 0.292443 | 2  | 8.230     |
| -0.8103360E 04 | 04 | -0.1408044E 05 | 05 | 0.1624595E 05 | 05 | 243.078 | 80.026 | 0.376693 | 3  | 12.346    |
| 0.7455311E 04  | 04 | 0.1217849E 04  | 04 | 0.3347913E 04 | 04 | 8.704   | 2.176  | 0.186608 | 4  | 16.461    |
| 0.3617656E 03  | 03 | -0.1140049E 04 | 04 | 0.1136070E 04 | 04 | 267.605 | 57.521 | 0.027733 | 5  | 20.576    |
| -0.4958271E 03 | 03 | -0.1200555E 03 | 03 | 0.5101549E 03 | 03 | 193.611 | 32.269 | 0.011829 | 6  | 24.691    |
| -0.8354963E 03 | 03 | -0.1650127E 04 | 04 | 0.2033031E 04 | 04 | 245.697 | 35.100 | 0.047370 | 7  | 28.807    |
| -0.1212832E 04 | 04 | -0.1319804E 03 | 03 | 0.1225403E 04 | 04 | 188.533 | 23.567 | 0.028437 | 8  | 32.922    |
| -0.1373466E 03 | 03 | -0.3146230E 03 | 03 | 0.3661873E 03 | 03 | 239.225 | 26.581 | 0.008491 | 9  | 37.037    |
| -0.3254655E 03 | 03 | 0.1062260E 04  | 04 | 0.1111135E 04 | 04 | 107.059 | 10.706 | 0.025764 | 10 | 41.152    |

BLADE CHORD AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1004 T 405 CTR 301 FLT 500.0 TR 22

| AJ             |    | BJ             |    | CJ            |    | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----|----------------|----|---------------|----|---------|--------|----------|----|-----------|
| -0.2736571E 05 | 05 |                |    |               |    |         |        |          |    |           |
| 0.2733444E 04  | 04 | 0.6106852E 04  | 04 | 0.6690631E 04 | 04 | 65.887  | 65.887 | 1.000000 | 1  | 4.115     |
| 0.3031184E 04  | 04 | 0.4850693E 03  | 03 | 0.3069730E 04 | 04 | 9.092   | 4.546  | 0.458809 | 2  | 8.230     |
| -0.2287513E 04 | 04 | -0.2520165E 04 | 04 | 0.3739438E 04 | 04 | 231.927 | 77.309 | 0.554421 | 3  | 12.346    |
| 0.2050721E 04  | 04 | 0.1544240E 03  | 03 | 0.2059817E 04 | 04 | 5.416   | 1.354  | 0.307663 | 4  | 16.461    |
| 0.3613447E 02  | 02 | -0.4170450E 03 | 03 | 0.3196577E 03 | 03 | 274.952 | 54.990 | 0.062573 | 5  | 20.576    |
| 0.6444571E 02  | 02 | 0.4163375E 03  | 03 | 0.4231221E 03 | 03 | 81.376  | 13.563 | 0.063240 | 6  | 24.691    |
| -0.4767156E 03 | 03 | -0.7062117E 03 | 03 | 0.8520320E 03 | 03 | 255.979 | 33.711 | 0.127349 | 7  | 28.807    |
| -0.4655865E 03 | 03 | -0.4270062E 02 | 02 | 0.4575937E 03 | 03 | 185.240 | 23.155 | 0.069880 | 8  | 32.922    |
| -0.2769705E 03 | 03 | -0.2404045E 03 | 03 | 0.3923333E 03 | 03 | 216.991 | 24.332 | 0.057107 | 9  | 37.037    |
| -0.7126180E 02 | 02 | 0.2623616E 03  | 03 | 0.2713733E 03 | 03 | 105.200 | 10.520 | 0.040635 | 10 | 41.152    |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 28 V= 173 KTS n= 1.45 g

BLADE TORSION AT STA 131.5  
HARMONIC ANALYSIS MODEL AM-36A SHIP 1003 T 403 CTR 301 FLT 300.0 TR 44

| PJ             | UJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2287157E 03  |                |               |         |         |          |    |           |
| 0.3165754E 04  | 0.3534710E 04  | 0.4745148E 04 | 48.151  | 48.151  | 1.000000 | 1  | 4.115     |
| -0.1556765E 04 | 0.2763346E 04  | 0.3171687E 04 | 119.395 | 59.698  | 0.668406 | 2  | 8.236     |
| 0.3351626E 04  | -0.1661785E 03 | 0.3474753E 03 | 331.429 | 110.476 | 0.073228 | 3  | 12.346    |
| -0.2790333E 03 | -0.7646965E 03 | 0.3140143E 03 | 244.953 | 62.688  | 0.171547 | 4  | 16.461    |
| -0.6427643E 02 | -0.3434656E 03 | 0.3497144E 03 | 259.415 | 51.883  | 0.073743 | 5  | 20.576    |
| -0.4947468E 03 | -0.4387126E 03 | 0.6649924E 03 | 221.279 | 36.880  | 0.140142 | 6  | 24.691    |
| -0.3236344E 03 | 0.2645483E 03  | 0.4211675E 03 | 140.210 | 20.030  | 0.088762 | 7  | 28.807    |
| 0.7605544E 03  | 0.1569020E 03  | 0.7765143E 03 | 11.656  | 1.457   | 0.163665 | 8  | 32.922    |
| 0.1636643E 03  | -0.1535069E 03 | 0.2515261E 03 | 309.706 | 34.412  | 0.053007 | 9  | 37.037    |
| -0.2520667E 02 | -0.1115823E 03 | 0.1143425E 03 | 257.273 | 25.727  | 0.024107 | 10 | 41.152    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 29 V= 170.5 KTS n= 1.62 g

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BLADE FEATHER ANGLE  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1339 T 435 CTR 337 FLT 500.0 TR 31

| AJ              | PJ              | CJ             | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|-----------------|-----------------|----------------|---------|---------|----------|----|-----------|
| 0.6553207F C1   |                 |                |         |         |          | 1  | 4.115     |
| 0.4656641F 01   | -0.4823909F 01  | 0.6526415E 01  | 315.779 | 315.779 | 1.000000 | 1  | 4.115     |
| -0.2176059F C0  | -0.3459687F 00  | 0.4434617E 00  | 231.764 | 15.482  | 0.363591 | 2  | 8.230     |
| -0.1056245F C0  | 0.3766609F -01  | 0.1149615E 00  | 167.972 | 54.324  | 0.016599 | 3  | 12.346    |
| -0.5586646F -01 | 0.7005612F -02  | 0.5964310E -01 | 177.809 | 44.377  | 0.008654 | 4  | 16.461    |
| 0.2524424F -01  | -0.2154659F -01 | 0.1735917E -01 | 212.539 | 62.532  | 0.375394 | 5  | 20.576    |
| 0.6472759F -01  | -0.2120047F -02 | 0.2802617E -02 | 284.401 | 47.400  | 0.000176 | 6  | 24.651    |
| -0.6553445F -02 | -0.5599971F -01 | 0.5559312E -01 | 269.288 | 38.470  | 0.008084 | 7  | 28.807    |
| -0.2321202F -01 | 0.1641709F -01  | 0.2048015E -01 | 144.799 | 18.133  | 0.334112 | 8  | 32.522    |
| 0.1471157F -01  | 0.1484541F -01  | 0.2045100F -01 | 25.485  | 2.832   | 0.005552 | 9  | 37.037    |
| 0.3271103F -02  | -0.2270557F -02 | 0.2253107F -02 | 278.097 | 27.410  | 0.000331 | 10 | 41.152    |

SHAFT MOMENT  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1339 T 435 CTR 337 FLT 500.0 TR 36

| AJ             | PJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.6341376F 04 |                |               |         |         |          | 1  | 4.115     |
| -0.1110723F 0A | 0.1046538F 0A  | 0.1526009F 0A | 136.704 | 136.704 | 1.000000 | 1  | 4.115     |
| -0.1142677F 01 | 0.4662267F 12  | 0.6163333E 00 | 175.660 | 87.830  | 0.004077 | 2  | 8.230     |
| -0.1715116F C5 | -0.3001133F 05 | 0.2458615F 05 | 243.105 | 80.065  | 0.226634 | 3  | 12.346    |
| -0.6596023F 03 | 0.6012044F 03  | 0.0925144E 03 | 137.650 | 34.412  | 0.005848 | 4  | 16.461    |
| -0.3554815F 04 | 0.7254513F 04  | 0.7114049E 04 | 115.683 | 23.196  | 0.053175 | 5  | 20.576    |
| 0.3771567F 02  | 0.2011332E 02  | 0.4275110F 03 | 29.094  | 4.692   | 0.002801 | 6  | 24.651    |
| -0.5153509E 04 | 0.5573078F 0A  | 0.7620761F 04 | 132.940 | 13.094  | 0.042977 | 7  | 28.807    |
| -0.1110723F 04 | -0.1042293F 04 | 0.1550238F 04 | 315.779 | 19.488  | 0.334112 | 8  | 32.522    |
| -0.3651900F C3 | -0.4275728F 03 | 0.5641106F 03 | 229.190 | 25.466  | 0.003702 | 9  | 37.037    |
| 0.1012337F C4  | 0.1052006F 03  | 0.1011705F 04 | 5.933   | 0.593   | 0.006566 | 10 | 41.152    |

PITCH LINK TENSION  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1339 T 435 CTR 307 FLT 500.0 TR 11

| AJ             | PJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.4153611F 02 |                |               |         |         |          | 1  | 4.115     |
| -0.1744237F 03 | -0.4530024F 03 | 0.4257872F 03 | 248.931 | 248.931 | 1.000000 | 1  | 4.115     |
| 0.2368273E 03  | -0.3835104F 03 | 0.4163087F 03 | 294.319 | 147.156 | 0.897697 | 2  | 8.230     |
| -0.1471039F 02 | -0.1573728F 03 | 0.2127071F 03 | 227.719 | 75.906  | 0.437867 | 3  | 12.346    |
| -0.0215576F C2 | -0.1545340F 02 | 0.0825464E 02 | 190.653 | 47.663  | 0.172086 | 4  | 16.461    |
| -0.4254325E 02 | 0.2243506E 12  | 0.5430971F 02 | 153.924 | 30.195  | 0.111982 | 5  | 20.576    |
| -0.2326684F C2 | -0.2028229F 02 | 0.457071F 02  | 219.255 | 19.876  | 0.044091 | 6  | 24.651    |
| -0.1786544F C2 | -0.6472314F 02 | 0.6598941E 02 | 258.757 | 36.065  | 0.135841 | 7  | 28.807    |
| -0.2435926E 02 | -0.1245767F 02 | 0.2711373F 02 | 237.451 | 25.931  | 0.055808 | 8  | 32.522    |
| -0.3890154F C2 | 0.2820753E 01  | 0.3467993F 02 | 168.613 | 18.737  | 0.081682 | 9  | 37.037    |
| -0.2532068F 02 | 0.2521657E 02  | 0.4330261E 02 | 125.649 | 12.570  | 0.089325 | 10 | 41.152    |

FIXED HUB FLAP AT STA 38  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 435 CTR 307 FLT 500.0 TR 1

| AJ              | PJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|-----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1370167F C5   |                |               |         |         |          | 1  | 4.115     |
| -0.1543158E C5  | 0.2198401F C5  | 0.2940713E 05 | 131.619 | 131.619 | 1.000000 | 1  | 4.115     |
| -0.0254723F 03  | -0.2332435F 05 | 0.2733340E 05 | 267.937 | 133.968 | 0.783445 | 2  | 8.230     |
| -0.1372746F 04  | -0.4251900F 04 | 0.5341344E 04 | 237.755 | 77.585  | 0.181634 | 3  | 12.346    |
| -0.2842715F 04  | 0.0212228F 03  | 0.2558600E 04 | 163.887 | 40.772  | 0.100620 | 4  | 16.461    |
| 0.6235142E 02   | 0.2705503F 04  | 0.2792773F 04 | 88.726  | 17.745  | 0.046884 | 5  | 20.576    |
| -0.13724165F 03 | 0.6005400F 03  | 0.6740119E 03 | 101.329 | 16.888  | 0.022922 | 6  | 24.651    |
| -0.0205039F 04  | 0.1001942F 03  | 0.6461746E 03 | 163.790 | 23.329  | 0.021974 | 7  | 28.807    |
| -0.1121819F 04  | -0.3893773F 03 | 0.1187713F 04 | 143.872 | 43.609  | 0.042377 | 8  | 32.522    |
| -0.1563475F C2  | -0.5096731E 02 | 0.5461400F 03 | 248.531 | 27.659  | 0.018572 | 9  | 37.037    |
| 0.1172166F 01   | -0.2504420F 03 | 0.5052139F 03 | 304.311 | 30.831  | 0.017181 | 10 | 41.152    |

# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 29 V= 170.5 KTS n= 1.62 g**

FIXED HUB CHORD AT STA 18  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 307 FLT 500.0 TR 3

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| C.4370584E C4  |                |               |         |        |          | 1  | 4.115     |
| C.7448525E J5  | J.4437427E J5  | J.8654819E J5 | 73.614  | 30.614 | 1.000000 | 2  | 8.230     |
| C.2492311E C5  | C.3416561E C4  | C.2613150E C5 | 7.297   | 3.646  | 0.301930 | 3  | 12.346    |
| -C.1632117E C5 | -0.2434215E C5 | 0.3014122E C5 | 237.217 | 79.072 | 0.345282 | 4  | 16.461    |
| C.1255553E J4  | J.2335724E J4  | J.2389553E J4 | 57.359  | 14.265 | 0.027614 | 5  | 20.576    |
| -C.3724944E C3 | J.4413817E C4  | 0.4429123E C4 | 94.824  | 19.965 | 0.051180 | 6  | 24.691    |
| C.3113484E C4  | C.3327262E C3  | 0.3131667E C4 | 6.092   | 1.615  | 0.036184 | 7  | 28.807    |
| C.2217463E J4  | J.2497272E J4  | J.3379688E J4 | 48.396  | 6.914  | 0.333500 | 8  | 32.922    |
| C.1018542E C3  | -0.1528870E C4 | 0.1531557E C4 | 777.023 | 34.128 | 0.022318 | 9  | 37.037    |
| C.1185549E C4  | -0.1176333E C4 | 0.1659196E C4 | 314.834 | 34.982 | 0.019166 | 10 | 41.152    |
| -C.2781423E C3 | -J.4756111E J3 | J.5168167E J3 | 237.441 | 23.744 | 0.335977 |    |           |

BLADE FLAP AT STA 130.5  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 307 FLT 500.0 TR 19

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| C.1277858E C5  |                |               |         |         |          | 1  | 4.115     |
| J.5854858E J4  | -J.4153121E J4 | J.7178318E J4 | 324.653 | 324.650 | 0.999079 | 2  | 8.230     |
| -C.2547456E C4 | 0.6552523E C4  | 0.7194974E C4 | 114.219 | 57.110  | 1.000000 | 3  | 12.346    |
| C.1640361E C3  | 0.1678473E C4  | 0.1683336E C4 | 76.762  | 25.581  | 0.234287 | 4  | 16.461    |
| C.1395755E J4  | -J.4715543E J3 | J.1435746E J4 | 343.857 | 85.214  | 0.200328 | 5  | 20.576    |
| -C.7207681E C3 | -0.8776861E C3 | 0.8480115E C3 | 255.142 | 51.028  | 0.124985 | 6  | 24.691    |
| -C.2507039E C3 | -0.3936358E C3 | 0.4569451E J3 | 237.527 | 39.548  | 0.064989 | 7  | 28.807    |
| -C.7678493E J1 | -J.8435344E J3 | J.8435435E J3 | 269.477 | 38.497  | 0.117927 | 8  | 32.922    |
| 0.5656670E C3  | 0.3074761E C2  | 0.6007519E C3 | 2.933   | 0.367   | 0.093613 | 9  | 37.037    |
| -C.1750845E C3 | -0.4256770E J2 | 0.1401915E C3 | 153.674 | 21.519  | 0.025079 | 10 | 41.152    |
| C.1261372E C3  | J.1535314E J3  | J.1969366E J3 | 49.862  | 4.986   | 0.327435 |    |           |

BLADE FLAP AT STA 205  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 307 FLT 500.0 TR 20

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -C.7147227E C4 |                |               |         |         |          | 1  | 4.115     |
| -C.7825824E J4 | 0.6793584E C4  | 0.7372870E C4 | 121.397 | 121.397 | 1.000000 | 2  | 8.230     |
| C.3105543E C4  | -0.3789556E C4 | 0.4054215E C4 | 310.166 | 155.083 | 0.671966 | 3  | 12.346    |
| -C.2246460E C4 | -0.1427584E C4 | 0.2661972E C4 | 212.442 | 70.814  | 0.361346 | 4  | 16.461    |
| J.1461555E J4  | -J.3790566E C3 | 0.1458474E C4 | 347.158 | 86.769  | 0.207244 | 5  | 20.576    |
| C.2401357E C3  | -0.3626467E C3 | 0.6073017E C3 | 288.091 | 57.618  | 0.178820 | 6  | 24.691    |
| -C.1147457E C3 | -J.3141450E C3 | 0.3018215E C3 | 252.503 | 42.084  | 0.051788 | 7  | 28.807    |
| C.1734357E J3  | -J.2751553E J3 | 0.2404548E C3 | 305.929 | 43.704  | 0.039396 | 8  | 32.922    |
| C.4775757E C2  | 0.1551897E C3  | 0.2807817E C3 | 76.346  | 9.543   | 0.027233 | 9  | 37.037    |
| -C.5288004E C2 | 0.3037245E C3  | 0.3176113E C3 | 107.004 | 11.889  | 0.043075 | 10 | 41.152    |
| -J.7674725E J2 | J.1198339E J3  | J.1753129E C3 | 107.052 | 10.705  | 0.016957 |    |           |

BLADE FLAP AT STA 235  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 307 FLT 500.0 TR 4

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| C.1123558E C4  |                |               |         |         |           | 1  | 4.115     |
| -J.9741111E C3 | 0.4773457E C4  | 0.4871728E C4 | 101.534 | 101.534 | 1.000000  | 2  | 8.230     |
| C.2700428E C4  | -0.9516621E C3 | 0.2476148E C4 | 334.836 | 169.918 | 0.590506  | 3  | 12.346    |
| -C.2403764E C4 | -0.1790346E C4 | 0.2731324E C4 | 208.187 | 69.346  | 0.3563719 | 4  | 16.461    |
| J.8954478E J2  | -0.9671119E C3 | 0.1310175E C4 | 312.860 | 79.215  | 0.273817  | 5  | 20.576    |
| -C.2525906E C3 | -0.1156234E C4 | 0.1192078E C4 | 255.800 | 51.160  | 0.244811  | 6  | 24.691    |
| -C.3603501E C3 | -0.1037500E C3 | 0.3749593E C4 | 196.062 | 33.479  | 0.157749  | 7  | 28.807    |
| -J.4517367E J3 | -J.6217654E C3 | 0.7685144E C3 | 234.002 | 40.936  | 0.255105  | 8  | 32.922    |
| C.1048035E C4  | -0.6680149E C3 | 0.1242328E C4 | 327.487 | 33.105  | 0.063808  | 9  | 37.037    |
| C.1571067E C3  | -0.2561235E C3 | 0.3352188E C2 | 297.548 | 29.556  | 0.029320  | 10 | 41.152    |
| -C.5162971E J2 | -J.1288645E J3 | 0.1428439E C3 | 295.559 |         |           |    |           |

# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 29 V= 170.5 KTS n= 1.62 g**

**BLADE FLAP AT STA 270**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 307 FLT 500.0 TR 26

| AJ             | HJ             | CJ            | PHJC    | PSJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| J.1554979F J4  |                |               |         |        |          |    |           |
| C.9744858F C2  | 0.1210764F C4  | 0.1214333F C4 | 85.563  | 85.563 | 0.419544 | 1  | 4.115     |
| C.1362049F C4  | 0.2165317F C3  | 0.1379152F C4 | 7.033   | 4.516  | 0.476469 | 2  | 8.230     |
| -J.2691232F J4 | -J.1047778F J4 | J.7854570F C4 | 201.222 | 67.074 | 1.000000 | 3  | 12.346    |
| -C.6344311F C2 | -0.8176314F C3 | C.4701169F C3 | 265.528 | 66.382 | 0.283340 | 4  | 16.461    |
| -C.8375837F C1 | -0.8300076F C3 | 0.1179715F C4 | 224.767 | 44.953 | 0.407576 | 5  | 20.576    |
| -J.1213921F J4 | J.5255530F C3  | J.1217445F J4 | 175.640 | 29.273 | 0.420602 | 6  | 24.691    |
| -C.4492491F C3 | -0.4752959F C3 | 0.1010145F C4 | 208.774 | 29.761 | 0.349001 | 7  | 28.807    |
| C.4495121F C3  | -0.4471833F C3 | 0.9687836F C3 | 37.377  | 37.377 | 0.334694 | 8  | 32.922    |
| J.3812964F J2  | -J.8540536F J3 | J.8557334F J3 | 272.554 | 30.784 | 0.295627 | 9  | 37.037    |
| C.1773205F C2  | -0.7107112F C3 | 0.4204046F C3 | 295.098 | 29.510 | 0.145241 | 10 | 41.152    |

**BLADE CHORD AT STA 103**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 307 FLT 500.0 TR 17

| AJ             | HJ             | CJ            | PHJC    | PSJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| C.2056377F C6  |                |               |         |        |          |    |           |
| C.3351119F C5  | 0.2727355F C5  | 0.4080022F J5 | 34.783  | 34.783 | 1.333333 | 1  | 4.115     |
| C.1664969F C5  | 0.5785337F C3  | 0.1669837F C5 | 1.849   | 0.074  | 0.409271 | 2  | 8.230     |
| -C.1296672F C5 | -0.1319223F C5 | 0.1428536F C5 | 223.940 | 74.647 | 0.472678 | 3  | 12.346    |
| C.5471588F C4  | -0.4566574F C3 | 0.5697770F C4 | 357.237 | 89.324 | 0.237444 | 4  | 16.461    |
| -J.4186767F C3 | J.6785800F C3  | 0.7077478F C3 | 121.672 | 24.334 | 0.019553 | 5  | 20.576    |
| -C.7596250F C3 | 0.2022767F C4  | 0.2053752F C4 | 99.971  | 16.667 | 0.050338 | 6  | 24.691    |
| -C.1902644F C4 | -0.3455546F C3 | 0.1939427F C4 | 191.477 | 27.354 | 0.345384 | 7  | 28.807    |
| J.1733321F J4  | 0.4657515F C3  | 0.1781231F C4 | 19.708  | 2.464  | 0.033854 | 8  | 32.922    |
| -C.1112790F C4 | 0.7433502F C3  | 0.1338226F C4 | 147.254 | 16.250 | 0.032800 | 9  | 37.037    |
| -C.8790137F C3 | 0.6744195F C3  | 0.1055068F C4 | 143.701 | 14.339 | 0.326843 | 10 | 41.152    |

**BLADE FLAP AT STA 174**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 307 FLT 500.0 TR 50

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| C.1830750F C4  |                |               |         |         |          |    |           |
| 0.5466902F C4  | -J.6026807F C4 | 0.7150408F C4 | 312.315 | 312.315 | 1.333333 | 1  | 4.115     |
| -J.2631874F J4 | 0.6227278F C4  | 0.6702533F C4 | 112.762 | 55.381  | 0.834628 | 2  | 8.230     |
| C.1641955F C4  | 0.1637195F C4  | 0.2718430F C4 | 44.923  | 14.974  | 0.284459 | 3  | 12.346    |
| -C.4337100F C3 | -0.3159080F C3 | 0.8518765F C3 | 200.807 | 50.202  | 0.139427 | 4  | 16.461    |
| -J.7314462F C3 | J.6635736F C3  | 0.5875528F C3 | 137.795 | 27.557  | 0.171171 | 5  | 20.576    |
| -C.7746454F C3 | 0.7435208F C3  | 0.5723040F C3 | 135.872 | 22.530  | 0.064083 | 6  | 24.691    |
| -C.4715254F C3 | 0.7722701F C3  | 0.4717177F C3 | 171.172 | 24.453  | 0.050546 | 7  | 28.807    |
| J.5432933F J3  | -J.6077771F C3 | 0.4569515F C3 | 309.714 | 19.668  | 0.105143 | 8  | 32.922    |
| C.1708769F C2  | -0.5515889F C3 | 0.5521926F C3 | 271.773 | 20.147  | 0.067750 | 9  | 37.037    |
| -C.2450561F C1 | -0.5401626F C3 | 0.5401626F C3 | 265.740 | 26.974  | 0.066279 | 10 | 41.152    |

**BLADE CHORD AT STA 235**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 307 FLT 500.0 TR 22

| AJ             | HJ             | CJ            | PHJC    | PSJC    | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -C.2705072F J5 |                |               |         |         |          |    |           |
| 0.4875976F C4  | 0.7335224F C4  | 0.6108591F C4 | 37.751  | 37.751  | 1.000000 | 1  | 4.115     |
| 0.4295617F C4  | -0.4791570F C3 | 0.4326234F C4 | 353.640 | 176.920 | 0.708225 | 2  | 8.230     |
| -C.3243323F C4 | -0.2715458F C4 | J.4611555F J4 | 216.137 | 72.346  | 0.754931 | 3  | 12.346    |
| 0.2547540F C4  | 0.7618450F C3  | 0.2573161F C4 | 8.084   | 7.021   | 0.431230 | 4  | 16.461    |
| -C.3059062F C3 | 0.7087228F C2  | 0.7200345F C3 | 165.548 | 33.110  | 0.042392 | 5  | 20.576    |
| -C.1472244F C3 | 0.6095714F C3  | J.7059711F J3 | 132.432 | 17.367  | 0.112298 | 6  | 24.691    |
| -C.1272227F C4 | 0.4413081F C3  | 0.1328656F C4 | 160.601 | 22.943  | 0.217507 | 7  | 28.807    |
| C.5226833F C3  | 0.6126974F C3  | 0.8062240F C3 | 49.493  | 6.167   | 0.131924 | 8  | 32.922    |
| C.3817329F C2  | 0.2291491F C3  | J.3311234F J3 | 83.728  | 9.333   | 0.354230 | 9  | 37.037    |
| -C.4773083F C2 | 0.7450000F C3  | 0.2799318F C3 | 99.230  | 9.923   | 0.044681 | 10 | 41.152    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 29 V= 170.5 KTS n= 1.62 g

BLADE TORSION AT STA 131.5  
HARMONIC ANALYSIS MODEL 4P-5AA SHIP 1005 \* 405 CYR 307 FLT 900.0 TR 44  
CYCLIC LOAD = 0.0612493 C4

7000 POSITION L540 1.45 LEAD/IN L150 12735.33

| AJ            | PJ             | IJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|---------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2832659 C3 |                |               |         |         |          |    |           |
| 0.3341680 C4  | 0.4447651F 04  | 0.5727824F 34 | 54.235  | 54.235  | 1.333333 | 1  | 4.115     |
| -0.7819140 C3 | 0.2754186E 04  | 0.2967818E 04 | 109.822 | 52.911  | 0.900689 | 2  | 8.230     |
| 0.5137550 C1  | -0.6714160F C1 | 0.3761470E 03 | 309.582 | 103.194 | 0.160760 | 3  | 12.346    |
| -0.7680170 C1 | -0.5004230E C2 | 0.7691475E 03 | 183.728 | 45.932  | 0.134370 | 4  | 16.461    |
| -0.2857644 C2 | 0.9473804E C3  | 0.9575149E C3 | 41.713  | 18.342  | 0.167169 | 5  | 20.576    |
| 0.1476665 C3  | 0.6458544F C3  | 0.6426759E C3 | 77.497  | 12.916  | 0.119381 | 6  | 24.691    |
| 0.1797652 C2  | 0.4824655E C2  | 0.1537446E C3 | 15.055  | 2.151   | 0.032428 | 7  | 28.807    |
| 0.1171174 C4  | -0.7271230F C3 | 0.1141398E C4 | 327.313 | 43.914  | 0.235363 | 8  | 32.922    |
| -0.1265555 C2 | -0.3755195F C3 | 0.3447722E C3 | 248.717 | 27.635  | 0.061065 | 9  | 37.037    |
| 0.3264771F C1 | 0.7399130F C2  | 0.740133E C2  | 87.471  | 8.747   | 0.012920 | 10 | 41.152    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 30 V= 122.5 KTS n= .99 g

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## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL 44-564 SHIP 1000 T 400 CTR 330 FLT 500.0 TR 31

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.6753377-01   |                |               |         |         |          |    |           |
| 0.4085979-01   | -0.36501397-01 | 0.24741137-01 | 318.225 | 318.225 | 1.000000 | 1  | 4.115     |
| -0.1873874-03  | -0.61696297-01 | 0.23311097-03 | 233.372 | 101.600 | 0.031656 | 2  | 8.230     |
| -0.71306237-02 | -0.24077767-01 | 0.27176777-01 | 250.210 | 65.403  | 0.005466 | 3  | 12.346    |
| 0.44331777-01  | -0.14164767-01 | 0.19354277-01 | 394.180 | 69.545  | 0.004132 | 4  | 16.461    |
| 0.13374677-01  | -0.51213617-03 | 0.13306337-01 | 357.290 | 71.463  | 0.001963 | 5  | 20.576    |
| 0.13746657-01  | -0.33281257-02 | 0.13501337-01 | 345.744 | 57.032  | 0.002475 | 6  | 24.691    |
| 0.17464677-02  | -0.25421117-01 | 0.23063337-01 | 272.678 | 33.326  | 0.004665 | 7  | 28.807    |
| -0.33054747-02 | -0.27523677-02 | 0.35773747-02 | 204.654 | 25.252  | 0.001204 | 8  | 32.922    |
| -0.36340777-02 | -0.35152327-02 | 0.35737747-02 | 301.123 | 33.458  | 0.000835 | 9  | 37.037    |
| -0.60605077-02 | 0.16157757-01  | 0.17311177-01 | 111.395 | 11.165  | 0.003177 | 10 | 41.152    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL 44-564 SHIP 1000 T 400 CTR 330 FLT 500.0 TR 35

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.51347477-04 |                |               |         |         |          |    |           |
| 0.43102337-04  | 0.71603307-05  | 0.71110137-05 | 80.767  | 80.767  | 1.000000 | 1  | 4.115     |
| -0.23038007-04 | -0.16543337-04 | 0.23333337-05 | 210.440 | 107.495 | 0.040573 | 2  | 8.230     |
| -0.92435147-04 | -0.14113337-05 | 0.16433337-05 | 230.668 | 78.950  | 0.237070 | 3  | 12.346    |
| 0.33373777-05  | 0.11312207-05  | 0.11112227-05 | 160.449 | 17.112  | 0.019448 | 4  | 16.461    |
| -0.13317777-05 | 0.44250557-05  | 0.11113337-05 | 156.406 | 31.357  | 0.015110 | 5  | 20.576    |
| 0.55513337-05  | -0.26770237-05 | 0.32733337-05 | 339.481 | 50.583  | 0.008335 | 6  | 24.691    |
| -0.24024407-05 | -0.21716717-05 | 0.32431177-05 | 222.293 | 31.749  | 0.043632 | 7  | 28.807    |
| -0.47905557-05 | 0.50136627-05  | 0.33333337-05 | 92.790  | 11.000  | 0.013823 | 8  | 32.922    |
| -0.14010177-05 | -0.36415337-05 | 0.13114017-05 | 191.583 | 21.247  | 0.002585 | 9  | 37.037    |
| 0.23975007-05  | -0.32770337-05 | 0.13227077-05 | 330.399 | 30.443  | 0.005401 | 10 | 41.152    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL 44-564 SHIP 1000 T 400 CTR 330 FLT 500.0 TR 41

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.24741507-03 |                |               |         |         |          |    |           |
| -0.23013247-03 | -0.35126477-02 | 0.23333337-03 | 190.740 | 190.740 | 1.000000 | 1  | 4.115     |
| 0.14464427-03  | -0.12401347-03 | 0.17113337-03 | 319.490 | 159.245 | 0.940501 | 2  | 8.230     |
| -0.22115177-02 | -0.51675337-02 | 0.16213237-02 | 250.336 | 65.461  | 0.449336 | 3  | 12.346    |
| -0.32945907-02 | -0.27021097-02 | 0.24431177-02 | 213.315 | 54.629  | 0.263240 | 4  | 16.461    |
| -0.25314457-02 | -0.16048537-02 | 0.27072177-02 | 202.811 | 43.302  | 0.130701 | 5  | 20.576    |
| 0.23424207-02  | -0.76137477-01 | 0.24433337-02 | 343.334 | 57.222  | 0.110553 | 6  | 24.691    |
| 0.13052447-02  | -0.17250407-02 | 0.23554377-02 | 317.747 | 45.390  | 0.122262 | 7  | 28.807    |
| 0.76450207-01  | 0.66022007-01  | 0.11133337-02 | 41.155  | 5.144   | 0.044390 | 8  | 32.922    |
| -0.13940757-01 | 0.21438587-01  | 0.10334337-02 | 172.340 | 17.149  | 0.076653 | 9  | 37.037    |
| -0.32048307-01 | 0.14125057-02  | 0.14477077-02 | 102.015 | 10.301  | 0.069091 | 10 | 41.152    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL 44-564 SHIP 1000 T 400 CTR 330 FLT 500.0 TR 4

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.33310157-04  |                |               |         |         |          |    |           |
| 0.51437657-04  | 0.15922337-05  | 0.16732737-05 | 72.097  | 72.097  | 1.000000 | 1  | 4.115     |
| 0.24335207-04  | -0.25470077-04 | 0.43343197-04 | 280.946 | 144.474 | 0.540240 | 2  | 8.230     |
| -0.12657427-04 | -0.28719077-04 | 0.31344637-04 | 240.215 | 82.072  | 0.167564 | 3  | 12.346    |
| -0.14400037-04 | -0.60450007-03 | 0.13001217-04 | 199.351 | 49.835  | 0.110545 | 4  | 16.461    |
| -0.28643707-03 | 0.24455147-03  | 0.37331337-03 | 134.329 | 27.300  | 0.022609 | 5  | 20.576    |
| -0.50607947-03 | -0.98894977-03 | 0.11673667-04 | 234.348 | 37.391  | 0.066702 | 6  | 24.691    |
| -0.35117337-03 | -1.48745737-03 | 0.33113637-03 | 214.239 | 33.405  | 0.035929 | 7  | 28.807    |
| 0.12344517-03  | -0.11309047-03 | 0.12136147-04 | 350.909 | 44.371  | 0.077064 | 8  | 32.922    |
| 0.92775107-02  | 0.16552207-03  | 0.13775127-03 | 60.720  | 6.748   | 0.011340 | 9  | 37.037    |
| 0.14547107-01  | -0.14440237-03 | 0.23077037-03 | 112.332 | 31.538  | 0.012294 | 10 | 41.152    |



# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 30 V= 122.5 KTS n= .99 g**

## **BLADE FLAP AT STA 270**

MECHANICAL ANALYSIS MODEL AM-504 SHIP 1000 T 435 CTR 336 FLT 500.0 TR 26

| AJ          | HJ | CJ         | PHIJC | PSIJC   | CJ/CJMAX | J        | FREQUENCY |
|-------------|----|------------|-------|---------|----------|----------|-----------|
| -0.03773507 | 04 | 0.13373335 | 04    | 24.159  | 24.159   | 1.000000 | 1 4.115   |
| 0.40446857  | 03 | 0.03137737 | 03    | 40.030  | 20.315   | 0.500918 | 2 8.230   |
| 0.49307603  | 03 | 0.02036717 | 03    | 193.442 | 64.064   | 0.496016 | 3 12.346  |
| -0.55033174 | 03 | 0.11525397 | 03    | 19.725  | 4.414    | 0.531437 | 4 16.461  |
| 0.22150475  | 03 | 0.03434732 | 03    | 110.538 | 62.106   | 0.522113 | 5 20.576  |
| -0.2554105  | 03 | 0.03100337 | 03    | 107.648 | 27.743   | 0.286083 | 6 24.691  |
| 0.35547957  | 03 | 0.04314372 | 03    | 333.530 | 47.847   | 0.386771 | 7 28.807  |
| 0.61444570  | 03 | 0.73323357 | 03    | 24.931  | 0.744    | 0.060282 | 8 32.922  |
| -0.62420475 | 03 | 0.02030137 | 03    | 126.421 | 14.047   | 0.380062 | 9 37.037  |
| 0.13760607  | 03 | 0.35437507 | 03    | 63.946  | 6.392    | 0.414574 | 10 41.152 |

## **BLADE CHORD AT STA 103**

MECHANICAL ANALYSIS MODEL AM-504 SHIP 1000 T 435 CTR 336 FLT 500.0 TR 17

| AJ          | HJ | CJ         | PHIJC | PSIJC      | CJ/CJMAX | J        | FREQUENCY |
|-------------|----|------------|-------|------------|----------|----------|-----------|
| 0.21050101  | 06 | 0.44170377 | 05    | 77.214     | 77.214   | 1.000000 | 1 4.115   |
| 0.11155415  | 05 | 0.03090607 | 05    | 63.150     | 34.075   | 0.110572 | 2 8.230   |
| 0.22253057  | 04 | 0.02608917 | 04    | 0.03720057 | 78.543   | 0.126372 | 3 12.346  |
| -0.33580000 | 04 | 0.01890055 | 04    | 0.03037537 | 355.496  | 0.052369 | 4 16.461  |
| 0.20340315  | 04 | 0.00053325 | 03    | 0.13361035 | 321.707  | 0.023807 | 5 20.576  |
| -0.24170145 | 04 | 0.00030610 | 02    | 0.04161717 | 230.047  | 0.001074 | 6 24.691  |
| 0.33605015  | 03 | 0.00727425 | 02    | 0.04475913 | 6.313    | 0.007710 | 7 28.807  |
| 0.00700147  | 03 | 0.11537133 | 01    | 0.13050777 | 24.772   | 0.020086 | 8 32.922  |
| 0.41131895  | 03 | 0.10930027 | 04    | 0.11731405 | 67.433   | 0.023265 | 9 37.037  |
| -0.57074457 | 02 | 0.04177193 | 03    | 0.02103133 | 262.219  | 0.008361 | 10 41.152 |

## **BLADE CHORD AT STA 235**

MECHANICAL ANALYSIS MODEL AM-504 SHIP 1000 T 435 CTR 336 FLT 500.0 TR 22

| AJ          | HJ | CJ         | PHIJC | PSIJC      | CJ/CJMAX | J        | FREQUENCY |
|-------------|----|------------|-------|------------|----------|----------|-----------|
| -0.20570135 | 03 | 0.00505555 | 04    | 0.03733215 | 72.091   | 1.000000 | 1 4.115   |
| 0.21511145  | 04 | 0.01070914 | 04    | 0.11000000 | 67.433   | 0.163051 | 2 8.230   |
| 0.33202057  | 03 | 0.00202020 | 03    | 0.07100000 | 212.770  | 0.138817 | 3 12.346  |
| -0.00100495 | 03 | 0.01494845 | 03    | 0.40700413 | 347.004  | 0.123946 | 4 16.461  |
| 0.04405900  | 03 | 0.04757971 | 03    | 0.00217555 | 250.045  | 0.071786 | 5 20.576  |
| -0.10042137 | 03 | 0.01385277 | 03    | 0.02367533 | 50.723   | 0.032653 | 6 24.691  |
| 0.12347575  | 03 | 0.03530227 | 03    | 0.00031670 | 264.430  | 0.051030 | 7 28.807  |
| -0.03401420 | 02 | 0.02407017 | 03    | 0.03032000 | 35.376   | 0.042356 | 8 32.922  |
| 0.00050507  | 02 | 0.00007613 | 03    | 0.00037575 | 04.467   | 0.142002 | 9 37.037  |
| 0.45441055  | 02 | 0.01647244 | 03    | 0.02425225 | 213.121  | 0.042775 | 10 41.152 |

## **BLADE TORSION AT STA 131.5**

MECHANICAL ANALYSIS MODEL AM-504 SHIP 1000 T 435 CTR 336 FLT 500.0 TR 44

| AJ          | HJ | CJ         | PHIJC | PSIJC      | CJ/CJMAX | J         | FREQUENCY |
|-------------|----|------------|-------|------------|----------|-----------|-----------|
| 0.57067207  | 05 | 0.15900905 | 04    | 0.27235525 | 35.920   | 1.000000  | 1 4.115   |
| 0.22032447  | 04 | 0.04495505 | 03    | 0.10220000 | 64.054   | 0.0522409 | 2 8.230   |
| -0.10350027 | 04 | 0.02502145 | 02    | 0.27519015 | 68.944   | 0.010225  | 3 12.346  |
| 0.49446607  | 03 | 0.0441502  | 01    | 0.11320000 | 45.974   | 0.050018  | 4 16.461  |
| -0.13374347 | 03 | 0.03531212 | 02    | 0.73360315 | 333.049  | 0.028687  | 5 20.576  |
| 0.24601447  | 02 | 0.03330035 | 03    | 0.71491355 | 206.748  | 0.272697  | 6 24.691  |
| -0.00252715 | 03 | 0.02509335 | 02    | 0.33210555 | 195.601  | 0.112424  | 7 28.807  |
| 0.22405095  | 03 | 0.02500077 | 03    | 0.00037235 | 336.422  | 0.234536  | 8 32.922  |
| 0.00050507  | 03 | 0.75432135 | 02    | 0.15333755 | 24.758   | 0.058823  | 9 37.037  |
| 0.13543555  | 03 | 0.03031355 | 03    | 0.13301035 | 24.194   | 0.048099  | 10 41.152 |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA

CASE 30 V= 122.5 KTS n= .99 g

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## FIXED HUB CHORD AT STA 18

4-11-57 ANALYSIS MODEL 30-200 SHIP 1300 T 405 CTR 330 FLT 500.0 TR 3

| CU            | CU            | CU            | PHIJC   | PSIJC  | CJ/CJMAX  | J  | FREQUENCY |
|---------------|---------------|---------------|---------|--------|-----------|----|-----------|
| 0.00000000 05 | 0.10000000 05 | 0.10000000 05 | 71.527  | 71.527 | 1.0000000 | 1  | 4.115     |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 79.626  | 57.563 | 0.094096  | 2  | 8.230     |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 247.755 | 62.555 | 0.002966  | 3  | 12.346    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 131.204 | 32.401 | 0.013903  | 4  | 16.461    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 129.302 | 75.360 | 0.012699  | 5  | 20.576    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 223.766 | 34.294 | 0.011022  | 6  | 24.691    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 121.759 | 21.660 | 0.010578  | 7  | 28.807    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 243.039 | 40.000 | 0.002375  | 8  | 32.922    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 249.428 | 29.403 | 0.019604  | 9  | 37.037    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 223.687 | 22.369 | 0.004357  | 10 | 41.152    |

## BLADE FLAP AT STA 130.5

4-11-57 ANALYSIS MODEL 30-200 SHIP 1300 T 405 CTR 330 FLT 500.0 TR 19

| CU            | CU            | CU            | PHIJC   | PSIJC  | CJ/CJMAX  | J  | FREQUENCY |
|---------------|---------------|---------------|---------|--------|-----------|----|-----------|
| 0.00000000 05 | 0.10000000 05 | 0.10000000 05 | 71.527  | 71.527 | 1.0000000 | 1  | 4.115     |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 79.626  | 57.563 | 0.094096  | 2  | 8.230     |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 247.755 | 62.555 | 0.002966  | 3  | 12.346    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 131.204 | 32.401 | 0.013903  | 4  | 16.461    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 129.302 | 75.360 | 0.012699  | 5  | 20.576    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 223.766 | 34.294 | 0.011022  | 6  | 24.691    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 121.759 | 21.660 | 0.010578  | 7  | 28.807    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 243.039 | 40.000 | 0.002375  | 8  | 32.922    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 249.428 | 29.403 | 0.019604  | 9  | 37.037    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 223.687 | 22.369 | 0.004357  | 10 | 41.152    |

## BLADE FLAP AT STA 205

4-11-57 ANALYSIS MODEL 30-200 SHIP 1300 T 405 CTR 330 FLT 500.0 TR 20

| CU            | CU            | CU            | PHIJC   | PSIJC  | CJ/CJMAX  | J  | FREQUENCY |
|---------------|---------------|---------------|---------|--------|-----------|----|-----------|
| 0.00000000 05 | 0.10000000 05 | 0.10000000 05 | 71.527  | 71.527 | 1.0000000 | 1  | 4.115     |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 79.626  | 57.563 | 0.094096  | 2  | 8.230     |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 247.755 | 62.555 | 0.002966  | 3  | 12.346    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 131.204 | 32.401 | 0.013903  | 4  | 16.461    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 129.302 | 75.360 | 0.012699  | 5  | 20.576    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 223.766 | 34.294 | 0.011022  | 6  | 24.691    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 121.759 | 21.660 | 0.010578  | 7  | 28.807    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 243.039 | 40.000 | 0.002375  | 8  | 32.922    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 249.428 | 29.403 | 0.019604  | 9  | 37.037    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 223.687 | 22.369 | 0.004357  | 10 | 41.152    |

## BLADE FLAP AT STA 235

4-11-57 ANALYSIS MODEL 30-200 SHIP 1300 T 405 CTR 330 FLT 500.0 TR 4

| CU            | CU            | CU            | PHIJC   | PSIJC  | CJ/CJMAX  | J  | FREQUENCY |
|---------------|---------------|---------------|---------|--------|-----------|----|-----------|
| 0.00000000 05 | 0.10000000 05 | 0.10000000 05 | 71.527  | 71.527 | 1.0000000 | 1  | 4.115     |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 79.626  | 57.563 | 0.094096  | 2  | 8.230     |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 247.755 | 62.555 | 0.002966  | 3  | 12.346    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 131.204 | 32.401 | 0.013903  | 4  | 16.461    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 129.302 | 75.360 | 0.012699  | 5  | 20.576    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 223.766 | 34.294 | 0.011022  | 6  | 24.691    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 121.759 | 21.660 | 0.010578  | 7  | 28.807    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 243.039 | 40.000 | 0.002375  | 8  | 32.922    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 249.428 | 29.403 | 0.019604  | 9  | 37.037    |
| 0.00000000 05 | 0.00000000 05 | 0.00000000 05 | 223.687 | 22.369 | 0.004357  | 10 | 41.152    |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 31 V= 123 KTS n= 1.11 g

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## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AH-56A SHIP 1000 T 405 CTR 345 FLT 500.0 TR 31

| CJ             | CJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| 0.7344507-01   | -0.34723347-01 | 0.55333227-01 | 321.106 | 321.106 | 1.0000000 | 1  | 4.098     |
| 0.4304331-01   | -0.76223447-01 | 0.11311071-01 | 203.700 | 102.850 | 0.032617  | 2  | 8.197     |
| -0.1005271-01  | 0.47479247-01  | 0.83333333-01 | 127.443 | 42.481  | 0.010427  | 3  | 12.295    |
| -0.3074627-01  | -0.1219477-02  | 0.03235247-01 | 358.350 | 89.725  | 0.011434  | 4  | 16.393    |
| 0.2507407-01   | -0.2432472-02  | 0.15777723-01 | 354.559 | 70.918  | 0.004664  | 5  | 20.492    |
| -0.1173403-01  | 0.18877147-02  | 0.11111111-01 | 170.501 | 29.477  | 0.002149  | 6  | 24.590    |
| -0.25351447-02 | -0.10153347-03 | 0.23175333-02 | 162.451 | 26.004  | 0.000459  | 7  | 28.688    |
| -0.55444337-02 | -0.21555557-01 | 0.23333333-01 | 247.340 | 33.917  | 0.004224  | 8  | 32.787    |
| -0.11057407-02 | -0.50435007-02 | 0.52277757-02 | 283.105 | 31.556  | 0.000746  | 9  | 36.885    |
| -0.65877557-02 | -0.38451527-02 | 0.70273337-02 | 210.271 | 21.027  | 0.001379  | 10 | 40.984    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AH-56A SHIP 1000 T 405 CTR 345 FLT 500.0 TR 36

| CJ             | CJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.70033757-04 | 0.7155331      | 0.7155331     | 40.868  | 40.868 | 1.000300 | 1  | 4.098     |
| -0.13340277-04 | -0.7434747-03  | 0.20703627-04 | 197.442 | 48.741 | 0.036593 | 2  | 8.197     |
| -0.23035447-04 | -0.20042807-03 | 0.20231707-03 | 235.913 | 74.038 | 0.334276 | 3  | 12.295    |
| -0.73144447-04 | 0.10551927-04  | 0.12333377-04 | 55.028  | 13.757 | 0.019010 | 4  | 16.393    |
| -0.13455777-04 | 0.10042477-04  | 0.22373447-04 | 153.332 | 30.066 | 0.031276 | 5  | 20.492    |
| -0.64716077-04 | -0.56160007-03 | 0.11017727-04 | 213.249 | 35.542 | 0.014027 | 6  | 24.590    |
| -0.12072277-04 | -0.44425007-04 | 0.31033337-04 | 247.493 | 35.385 | 0.044458 | 7  | 28.688    |
| -0.43813427-04 | 0.30877547-03  | 0.31213707-03 | 43.440  | 12.305 | 0.004363 | 8  | 32.787    |
| 0.10270857-04  | -0.10228017-04 | 0.14444447-04 | 315.123 | 35.013 | 0.020261 | 9  | 36.885    |
| 0.10474747-04  | 0.71054737-03  | 0.17333337-04 | 24.343  | 2.434  | 0.024248 | 10 | 40.984    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AH-56A SHIP 1000 T 405 CTR 345 FLT 500.0 TR 11

| CJ             | CJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| -0.31728307-03 | -0.56004097-02 | 0.17100237-03 | 210.307 | 210.307 | 1.000000  | 1  | 4.098     |
| -0.15582177-03 | -0.11508407-03 | 0.17331747-03 | 322.612 | 161.306 | 0.944026  | 2  | 8.197     |
| -0.15131407-03 | -0.12793337-03 | 0.14175337-03 | 244.315 | 81.438  | 0.740676  | 3  | 12.295    |
| -0.22473477-01 | -0.48103347-02 | 0.50130137-02 | 272.791 | 68.150  | 0.240830  | 4  | 16.393    |
| -0.33134147-02 | -0.23303337-02 | 0.53123337-02 | 212.876 | 42.577  | 0.224503  | 5  | 20.492    |
| 0.27121677-02  | 0.12817147-01  | 0.27121337-02 | 2.706   | 0.451   | 0.141605  | 6  | 24.590    |
| 0.22754617-02  | 0.67207607-03  | 0.22100277-02 | 2.191   | 0.313   | 0.113442  | 7  | 28.688    |
| -0.37444017-01 | 0.10074517-01  | 0.36733007-01 | 163.097 | 20.387  | 0.014164  | 8  | 32.787    |
| -0.11035747-02 | 0.14975347-01  | 0.11136137-02 | 172.272 | 19.141  | 0.0358107 | 9  | 36.885    |
| -0.48410077-01 | 0.10400007-02  | 0.11300027-02 | 117.247 | 11.724  | 0.092534  | 10 | 40.984    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AH-56A SHIP 1000 T 405 CTR 345 FLT 500.0 TR 1

| CJ             | CJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.10394607-05  | 0.15214247-05  | 0.15214247-05 | 72.308  | 72.308  | 1.000000 | 1  | 4.098     |
| 0.44815837-04  | -0.80800027-04 | 0.77331547-04 | 296.504 | 143.252 | 0.555630 | 2  | 8.197     |
| 0.40334147-04  | -0.32758107-04 | 0.37471337-04 | 233.433 | 77.810  | 0.250755 | 3  | 12.295    |
| -0.13342007-04 | -0.11179647-04 | 0.21523327-04 | 211.293 | 52.423  | 0.132317 | 4  | 16.393    |
| -0.33350307-05 | 0.30351307-03  | 0.77522447-03 | 122.003 | 33.401  | 0.047658 | 5  | 20.492    |
| -0.11491447-05 | -0.74505517-03 | 0.11491447-03 | 255.405 | 42.744  | 0.047698 | 6  | 24.590    |
| 0.12244777-05  | -0.35004907-03 | 0.37333337-03 | 287.333 | 41.333  | 0.022841 | 7  | 28.688    |
| 0.11444337-04  | -0.34031427-03 | 0.11444337-03 | 341.162 | 42.545  | 0.007042 | 8  | 32.787    |
| 0.15550607-03  | 0.24570187-03  | 0.33431337-03 | 63.035  | 5.737   | 0.020859 | 9  | 36.885    |
| 0.22591407-03  | -0.10209007-03 | 0.22591407-03 | 339.728 | 33.573  | 0.012269 | 10 | 40.984    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 31 V = 123 KTS n = 1.11 g

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FIXED WING CHORD AT STA 10

WING TIP ANALYSIS MODEL AM-504 SHIP 1304 T 405 CTR 345 FLT 500.0 TR 3

| UJ              | UJ             | UJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|-----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.493067547 05  |                |               |         |        |          |    |           |
| 0.492110001 05  | 0.492110001 05 | 0.13207549 06 | 62.736  | 62.736 | 1.000000 | 1  | 4.098     |
| 0.491444104 04  | 0.491444104 04 | 0.13033177 05 | 64.216  | 64.108 | 0.102546 | 2  | 8.197     |
| -0.490667207 04 | -0.49176172 04 | 0.13033177 05 | 241.590 | 83.527 | 0.101438 | 3  | 12.295    |
| -0.491174477 04 | -0.15447121 04 | 0.13033177 05 | 216.175 | 54.344 | 0.025598 | 4  | 16.393    |
| -0.493300062 04 | -0.15595357 04 | 0.24741177 04 | 213.033 | 42.607 | 0.024338 | 5  | 20.492    |
| -0.493518337 04 | -0.14200147 03 | 0.13033177 05 | 208.795 | 34.749 | 0.015051 | 6  | 24.590    |
| -0.491316594 04 | 0.12088065 04  | 0.13033177 05 | 142.785 | 20.376 | 0.011504 | 7  | 28.689    |
| -0.492000000 04 | -0.20590000 03 | 0.21411023 04 | 352.796 | 44.123 | 0.021285 | 8  | 32.787    |
| 0.492327645 03  | -0.21542071 04 | 0.23423125 04 | 293.463 | 32.607 | 0.023340 | 9  | 36.885    |
| 0.492453247 02  | 0.16543071 02  | 0.13033177 05 | 13.126  | 1.013  | 0.000920 | 10 | 40.984    |

BLADE FLAP AT STA 130.5

WING TIP ANALYSIS MODEL AM-504 SHIP 1304 T 405 CTR 345 FLT 500.0 TR 19

| UJ             | UJ             | UJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.11001647 05  |                |               |         |         |          |    |           |
| 0.109134897 04 | -0.20614735 04 | 0.30013030 04 | 324.190 | 324.190 | 1.000000 | 1  | 4.098     |
| -0.10913217 04 | 0.24101131 04  | 0.31233377 04 | 124.565 | 64.782  | 0.617673 | 2  | 8.197     |
| 0.109420445 03 | 0.10636306 04  | 0.12003035 04 | 57.242  | 19.091  | 0.244428 | 3  | 12.295    |
| 0.11175257 03  | -0.35730501 02 | 0.11237123 03 | 2.521   | 0.033   | 0.163541 | 4  | 16.393    |
| 0.113061007 03 | -0.14020317 03 | 0.23360332 03 | 318.815 | 63.783  | 0.056035 | 5  | 20.492    |
| 0.10819555 03  | 0.17233297 03  | 0.13003312 03 | 20.372  | 4.559   | 0.076764 | 6  | 24.590    |
| 0.10140300 03  | -0.49034300 02 | 0.13711075 03 | 345.074 | 44.236  | 0.035014 | 7  | 28.689    |
| 0.17718117 03  | 0.34109445 03  | 0.42320027 03 | 65.006  | 8.133   | 0.083331 | 8  | 32.787    |
| -0.10948571 03 | 0.11517477 02  | 0.13033177 05 | 143.431 | 15.937  | 0.027032 | 9  | 36.885    |
| 0.10948795 02  | 0.35557111 02  | 0.13033177 05 | 32.094  | 3.307   | 0.020155 | 10 | 40.984    |

BLADE FLAP AT STA 205

WING TIP ANALYSIS MODEL AM-504 SHIP 1304 T 405 CTR 345 FLT 500.0 TR 20

| UJ             | UJ             | UJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.10948795 04 |                |               |         |         |          |    |           |
| -0.10948795 04 | 0.34010457 04  | 0.44371770 04 | 123.304 | 123.304 | 1.000000 | 1  | 4.098     |
| 0.10948795 04  | -0.12049771 04 | 0.27032377 04 | 332.768 | 160.344 | 0.549782 | 2  | 8.197     |
| -0.10948795 04 | -0.00060247 04 | 0.12303377 04 | 213.126 | 70.043  | 0.262326 | 3  | 12.295    |
| 0.10948795 03  | 0.32004147 03  | 0.04475673 03 | 24.307  | 7.077   | 0.149230 | 4  | 16.393    |
| 0.10948795 03  | -0.27010713 02 | 0.33331122 03 | 347.234 | 64.451  | 0.074951 | 5  | 20.492    |
| 0.10948795 03  | 0.27100371 03  | 0.30331123 03 | 44.676  | 8.113   | 0.076327 | 6  | 24.590    |
| 0.10948795 03  | 0.10340727 01  | 0.23333300 03 | 0.444   | 0.063   | 0.051453 | 7  | 28.689    |
| -0.10948795 03 | 0.13374347 03  | 0.17711123 03 | 132.003 | 16.500  | 0.037065 | 8  | 32.787    |
| -0.10948795 02 | -0.43136267 02 | 0.34333323 02 | 232.464 | 25.829  | 0.011007 | 9  | 36.885    |
| 0.10948795 02  | -0.58527077 02 | 0.31197311 02 | 45.344  | 4.554   | 0.017798 | 10 | 40.984    |

BLADE FLAP AT STA 235

WING TIP ANALYSIS MODEL AM-504 SHIP 1304 T 405 CTR 345 FLT 500.0 TR 4

| UJ             | UJ             | UJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.10948795 03  |                |               |         |         |          |    |           |
| -0.10948795 03 | 0.25009447 04  | 0.27337327 04 | 101.371 | 101.371 | 1.000000 | 1  | 4.098     |
| 0.10948795 04  | -0.18147187 03 | 0.17270733 04 | 303.470 | 160.344 | 0.675737 | 2  | 8.197     |
| -0.10948795 03 | -0.43440554 03 | 0.77073377 03 | 213.436 | 71.145  | 0.311231 | 3  | 12.295    |
| 0.10948795 03  | 0.52713311 03  | 0.13033177 05 | 31.272  | 7.568   | 0.408995 | 4  | 16.393    |
| -0.10948795 03 | -0.17520047 03 | 0.34222332 03 | 323.557 | 65.711  | 0.133653 | 5  | 20.492    |
| 0.10948795 03  | 0.03482577 02  | 0.28543127 03 | 12.845  | 2.147   | 0.112226 | 6  | 24.590    |
| 0.10948795 03  | -0.14704707 02 | 0.37322495 03 | 328.620 | 46.446  | 0.148010 | 7  | 28.689    |
| 0.10948795 03  | 0.49936394 03  | 0.77073377 03 | 43.511  | 5.064   | 0.294049 | 8  | 32.787    |
| 0.10948795 03  | 0.43449100 02  | 0.20334537 03 | 11.450  | 1.324   | 0.032076 | 9  | 36.885    |
| -0.10948795 03 | -0.42755433 02 | 0.11023177 03 | 232.717 | 20.200  | 0.043184 | 10 | 40.984    |

# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 31 V= 123 KTS n= 1.11 g**

## **BLADE FLAP AT STA 270**

HARMONIC ANALYSIS MODEL 3H-50A SHIP 1000 T 405 CTR 345 FLT 500.0 TR 26

| UJ             | UJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|-----------|----|-----------|
| 0.10097307 04  | 0.40054427 03  | 0.11333377 04 | 20.001  | 20.001 | 1.0000000 | 1  | 4.098     |
| 0.11002707 04  | 0.11001107 03  | 0.07171037 03 | 13.031  | 5.310  | 0.598755  | 2  | 8.197     |
| 0.05535707 03  | -0.41507407 03 | 0.41533337 03 | 253.222 | 44.407 | 0.382586  | 3  | 12.295    |
| -0.12532247 03 | -0.41507407 03 | 0.41533337 03 | 253.222 | 44.407 | 0.382586  | 4  | 16.393    |
| 0.45038707 03  | 0.40380417 02  | 0.43723717 03 | 2.409   | 0.017  | 0.825532  | 5  | 20.492    |
| 0.33355507 03  | 0.15713047 02  | 0.33133337 03 | 3.527   | 0.705  | 0.267461  | 6  | 24.590    |
| 0.00135307 01  | 0.33135557 02  | 0.33135557 02 | 40.138  | 14.356 | 0.073404  | 7  | 28.689    |
| 0.17344507 03  | -0.25450107 03 | 0.31232707 03 | 304.734 | 43.307 | 0.275273  | 8  | 32.787    |
| 0.72340007 03  | 0.35414117 03  | 0.33702077 03 | 26.008  | 3.251  | 0.711354  | 9  | 36.885    |
| 0.15531707 03  | 0.20055507 03  | 0.20433777 03 | 51.582  | 5.709  | 0.233303  | 10 | 40.984    |
| 0.01045077 02  | -0.04130407 02 | 0.11333377 03 | 304.584 | 30.464 | 0.059280  |    |           |

## **BLADE CHORD AT STA 103**

HARMONIC ANALYSIS MODEL 3H-50A SHIP 1000 T 405 CTR 345 FLT 500.0 TR 17

| UJ             | UJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|-----------|----|-----------|
| 0.25771407 00  | 0.40341107 03  | 0.40377137 03 | 71.115  | 71.115 | 1.0000000 | 1  | 4.098     |
| 0.13052747 03  | 0.50331057 04  | 0.03033247 04 | 50.322  | 28.311 | 0.123448  | 2  | 8.197     |
| 0.33301207 04  | -0.05150007 04 | 0.73461107 04 | 233.056 | 77.380 | 0.155109  | 3  | 12.295    |
| -0.33301107 04 | -0.05150007 04 | 0.73461107 04 | 233.056 | 77.380 | 0.155109  | 4  | 16.393    |
| 0.23071357 04  | -0.41504457 03 | 0.33101337 04 | 352.056 | 40.314 | 0.061560  | 5  | 20.492    |
| -0.23071357 03 | -0.41504457 03 | 0.33101337 04 | 352.056 | 40.314 | 0.061560  | 6  | 24.590    |
| -0.41507077 03 | -0.46693447 03 | 0.62743307 03 | 223.049 | 38.303 | 0.012919  | 7  | 28.689    |
| -0.41507077 03 | -0.46693447 03 | 0.62743307 03 | 223.049 | 38.303 | 0.012919  | 8  | 32.787    |
| 0.41507077 03  | -0.46693447 03 | 0.62743307 03 | 223.049 | 38.303 | 0.012919  | 9  | 36.885    |
| 0.41507077 03  | -0.46693447 03 | 0.62743307 03 | 223.049 | 38.303 | 0.012919  | 10 | 40.984    |

## **BLADE CHORD AT STA 235**

HARMONIC ANALYSIS MODEL 3H-50A SHIP 1000 T 405 CTR 345 FLT 500.0 TR 22

| UJ             | UJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|-----------|----|-----------|
| -0.25445107 03 | 0.40576407 04  | 0.23323337 04 | 67.534  | 67.534 | 1.0000000 | 1  | 4.098     |
| 0.25445107 03  | 0.40576407 04  | 0.23323337 04 | 67.534  | 67.534 | 1.0000000 | 2  | 8.197     |
| 0.06100107 03  | -0.70109337 03 | 0.11103327 04 | 57.179  | 24.590 | 0.145903  | 3  | 12.295    |
| -0.06100107 03 | -0.70109337 03 | 0.11103327 04 | 57.179  | 24.590 | 0.145903  | 4  | 16.393    |
| 0.74276707 03  | -0.27083777 03 | 0.71535407 03 | 339.477 | 84.944 | 0.114694  | 5  | 20.492    |
| 0.33076507 01  | -0.41500427 02 | 0.31037137 02 | 272.300 | 54.471 | 0.013295  | 6  | 24.590    |
| -0.33076507 02 | -0.41500427 02 | 0.31037137 02 | 272.300 | 54.471 | 0.013295  | 7  | 28.689    |
| -0.57110407 02 | -0.23355557 03 | 0.23355557 03 | 251.032 | 30.976 | 0.042707  | 8  | 32.787    |
| -0.57110407 03 | -0.23355557 03 | 0.23355557 03 | 251.032 | 30.976 | 0.042707  | 9  | 36.885    |
| -0.57110407 03 | -0.23355557 03 | 0.23355557 03 | 251.032 | 30.976 | 0.042707  | 10 | 40.984    |

## **BLADE TORSION AT STA 331.5**

HARMONIC ANALYSIS MODEL 3H-50A SHIP 1000 T 405 CTR 345 FLT 500.0 TR 44

| UJ             | UJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|-----------|----|-----------|
| 0.48016077 02  | 0.16717007 04  | 0.26772707 04 | 30.630  | 30.630 | 1.0000000 | 1  | 4.098     |
| 0.20017207 04  | 0.70381677 03  | 0.13531457 04 | 145.762 | 72.881 | 0.520354  | 2  | 8.197     |
| -0.11517107 04 | 0.17434007 03  | 0.17434007 03 | 63.529  | 21.170 | 0.057754  | 3  | 12.295    |
| 0.48016077 02  | -0.64524007 02 | 0.30570607 03 | 189.739 | 47.410 | 0.143045  | 4  | 16.393    |
| -0.33354047 03 | 0.61444137 02  | 0.70776397 02 | 170.625 | 25.725 | 0.370424  | 5  | 20.492    |
| -0.65171107 02 | -0.42041317 03 | 0.72916707 03 | 216.080 | 36.013 | 0.272354  | 6  | 24.590    |
| -0.55521457 03 | -0.27145537 03 | 0.27145537 03 | 265.722 | 37.047 | 0.081719  | 7  | 28.689    |
| -0.17459117 02 | 0.17526107 03  | 0.17526107 03 | 7.355   | 3.519  | 0.317735  | 8  | 32.787    |
| 0.81340457 03  | 0.85270517 02  | 0.12624307 03 | 42.487  | 4.721  | 0.047155  | 9  | 36.885    |
| 0.92049077 02  | 0.50091007 02  | 0.51573107 02 | 37.765  | 3.777  | 0.034204  | 10 | 40.984    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 32 V= 123 KTS n= 1.24 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 351 FLT 500.0 TR 31

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.710045JE 01  | -0.3014045E C1 | 0.5540524E 01 | 327.415 | 327.415 | 1.000000 | 1  | 4.115     |
| 0.4715574E C1  | -0.1013274E 00 | 0.1244635E 00 | 234.502 | 117.251 | 0.022239 | 2  | 8.230     |
| -0.7227124E 01 | 0.1017034E 01  | 0.5472127E 01 | 170.026 | 56.675  | 0.010492 | 3  | 12.346    |
| 0.7506514E 01  | 0.1022404E 01  | 0.7591612E 01 | 8.206   | 2.051   | 0.013552 | 4  | 16.461    |
| -0.2314330E 01 | -0.1670906E 01 | 0.1403253E 01 | 215.901 | 43.180  | 0.005116 | 5  | 20.576    |
| -0.3353204E 01 | 0.5336002E 03  | 0.3353135E 01 | 178.949 | 29.433  | 0.005456 | 6  | 24.691    |
| 0.1677230E 01  | -0.2475740E 02 | 0.1473247E 01 | 333.191 | 47.599  | 0.003358 | 7  | 28.807    |
| -0.2432205E 01 | -0.2358290E 01 | 0.3416191E 01 | 224.591 | 28.074  | 0.006104 | 8  | 32.922    |
| -0.1441705E 01 | -0.1133606E 02 | 0.1412395E 01 | 202.353 | 22.484  | 0.002682 | 9  | 37.037    |
| -0.3239486E 02 | -0.6350348E 02 | 0.7124443E 02 | 242.473 | 24.297  | 0.001274 | 10 | 41.152    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 351 FLT 500.0 TR 34

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.4056871E 04 | 0.7233081E C5  | 0.7413363E 05 | 102.662 | 102.662 | 1.000000 | 1  | 4.115     |
| -0.1024582E 05 | -0.2512880E C4 | 0.3020422E 04 | 238.395 | 119.198 | 0.040750 | 2  | 8.230     |
| -0.1503140E 04 | -0.2310291E C5 | 0.2784024E 05 | 236.064 | 78.688  | 0.375622 | 3  | 12.346    |
| -0.1554571E 05 | 0.5743315E C3  | 0.5831030E 03 | 19.015  | 19.904  | 0.007876 | 4  | 16.461    |
| 0.1052552E 03  | -0.1046543E 04 | 0.4163023E 04 | 142.272 | 39.354  | 0.050150 | 5  | 20.576    |
| -0.4016011E 04 | 0.2134642E 03  | 0.3440270E 03 | 14.569  | 2.428   | 0.011447 | 6  | 24.691    |
| 0.8213401E 03  | -0.2134642E 03 | 0.5493070E 04 | 235.410 | 38.273  | 0.014065 | 7  | 28.807    |
| -0.1521882E 04 | -0.5275005E 04 | 0.7573001E 03 | 286.584 | 35.823  | 0.010211 | 8  | 32.922    |
| 0.2100010E 03  | -0.7255173E C3 | 0.2013940E 04 | 32.4534 | 36.059  | 0.027233 | 9  | 37.037    |
| 0.1044304E 04  | -0.1171385E 04 | 0.6030407E 03 | 107.645 | 10.765  | 0.000181 | 10 | 41.152    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 351 FLT 500.0 TR 11

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.3027354E C3 | -0.1610068E 03 | 0.2270768E 03 | 225.371 | 225.371 | 1.000000 | 1  | 4.115     |
| -0.1595245E C3 | -0.1134407E C3 | 0.1070395E 03 | 317.201 | 158.601 | 0.735001 | 2  | 8.230     |
| 0.1225440E 03  | -0.1249453E C3 | 0.1303045E 03 | 232.586 | 77.529  | 0.690529 | 3  | 12.346    |
| -0.9526877E 02 | -0.4622900E 02 | 0.4933013E 02 | 250.018 | 62.055  | 0.215811 | 4  | 16.461    |
| -0.1020102E 02 | -0.4340724E C2 | 0.5113491E 02 | 238.090 | 47.618  | 0.225184 | 5  | 20.576    |
| -0.2732604E 02 | -0.1563089E C2 | 0.4773533E 02 | 343.878 | 50.813  | 0.210215 | 6  | 24.691    |
| 0.4310101E 02  | -0.1217751E C2 | 0.2430553E 02 | 329.601 | 47.086  | 0.105977 | 7  | 28.807    |
| 0.2075656E 02  | 0.1563089E C1  | 0.1244477E 02 | 31.455  | 3.744   | 0.054804 | 8  | 32.922    |
| 0.1055047E 02  | -0.1736400E 01 | 0.1440341E 02 | 173.113 | 19.235  | 0.063708 | 9  | 37.037    |
| -0.1437592E 02 | 0.5857322E 01  | 0.1336770E 01 | 45.230  | 4.523   | 0.036581 | 10 | 41.152    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 351 FLT 500.0 TR 1

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2064705E 05  | 0.1500066E C5  | 0.1633240E 05 | 80.238  | 80.238  | 1.000000 | 1  | 4.115     |
| 0.2718371E 04  | -0.8244617E C4 | 0.9125248E 04 | 245.379 | 147.690 | 0.569164 | 2  | 8.230     |
| 0.3911100E 04  | -0.3285905E 04 | 0.4071436E 04 | 224.357 | 74.786  | 0.251367 | 3  | 12.346    |
| -0.3340082E 04 | -0.1040744E C4 | 0.2023403E 04 | 218.491 | 54.748  | 0.163441 | 4  | 16.461    |
| -0.2036710E 04 | 0.2530864E 02  | 0.1002450E 04 | 176.636 | 35.727  | 0.060299 | 5  | 20.576    |
| -0.1062455E 04 | -0.5740044E 03 | 0.4700347E 03 | 268.183 | 44.047  | 0.000765 | 6  | 24.691    |
| -0.3068442E 02 | -0.5140442E 03 | 0.5529187E 03 | 291.428 | 41.633  | 0.034407 | 7  | 28.807    |
| 0.2020020E 03  | -0.1117796E 03 | 0.1533607E 04 | 355.834 | 44.474  | 0.045970 | 8  | 32.922    |
| 0.1534405E 04  | 0.1440375E C3  | 0.2430553E 03 | 30.245  | 3.366   | 0.017809 | 9  | 37.037    |
| 0.2460437E 03  | -0.1707105E 02 | 0.2330744E 03 | 325.743 | 35.574  | 0.014850 | 10 | 41.152    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 32 V= 123 KTS n= 1.24 g

FIXED WING CHORD AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 351 FLT 500.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.4921491E 05 |                |               |         |        |          | 1  | 4.115     |
| 0.5821559E 05  | 0.8574706E 05  | 0.1036440E 06 | 55.825  | 55.825 | 1.000000 | 2  | 8.230     |
| 0.2814419E 04  | 0.1045093E 05  | 0.1042405E 05 | 74.936  | 37.468 | 0.104463 | 3  | 12.346    |
| -0.4335404E 04 | -0.1074136E 05 | 0.1154336E 05 | 248.019 | 82.673 | 0.111761 | 4  | 16.461    |
| 0.1687191E 04  | 0.1485066E 03  | 0.1633714E 04 | 5.030   | 1.258  | 0.016342 | 5  | 20.576    |
| -0.2449850F 04 | -0.5265908E 03 | 0.2503805E 04 | 192.131 | 38.426 | 0.024177 | 6  | 24.691    |
| -0.1336C16E 04 | -0.5815105E 03 | 0.1449217E 04 | 202.746 | 55.799 | 0.015983 | 7  | 28.807    |
| -0.1518735E 04 | 0.9872361E 03  | 0.1800543E 04 | 147.508 | 21.073 | 0.017373 | 8  | 32.922    |
| 0.1625554E 04  | -0.6511436E 03 | 0.1751303E 04 | 338.173 | 42.272 | 0.016497 | 9  | 37.037    |
| 0.3860322F 03  | -0.2765188E 04 | 0.2733805E 04 | 277.694 | 30.655 | 0.026577 | 10 | 41.152    |
| -0.5376558E 02 | 0.1067135E 03  | 0.1134345E 03 | 118.742 | 11.674 | 0.001153 |    |           |

BLADE FLAP AT STA 130.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 351 FLT 500.0 TR 19

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1164130E 05  |                |               |         |         |          | 1  | 4.115     |
| 0.4545C04E 04  | -0.3007631E 04 | 0.5450035E 04 | 326.506 | 326.506 | 1.000000 | 2  | 8.230     |
| -0.1751254E 04 | 0.2265104E 04  | 0.2808143E 04 | 127.709 | 63.855  | 0.525344 | 3  | 12.346    |
| 0.4235547E 03  | 0.1140308E 04  | 0.1505581E 04 | 52.192  | 17.397  | 0.276435 | 4  | 16.461    |
| 0.8517898F 03  | 0.1794792E 03  | 0.8734934E 03 | 11.899  | 2.975   | 0.159723 | 5  | 20.576    |
| 0.4408687E 03  | -0.3317566E 03 | 0.3517734E 03 | 323.040 | 64.608  | 0.101242 | 6  | 24.691    |
| 0.6241401E 03  | 0.1564914E 03  | 0.6443412E 03 | 14.012  | 2.335   | 0.118974 | 7  | 28.807    |
| 0.1450730E 03  | 0.5864585E 02  | 0.2037122E 03 | 16.746  | 2.392   | 0.037378 | 8  | 32.922    |
| 0.2476459E 03  | 0.4658052E 03  | 0.5276200E 03 | 62.001  | 7.750   | 0.076810 | 9  | 37.037    |
| 0.6283674E 02  | -0.2551703E 01 | 0.6288854E 02 | 357.675 | 39.742  | 0.011539 | 10 | 41.152    |
| 0.7049370E 02  | -0.2309184E 02 | 0.7417944E 02 | 341.863 | 34.186  | 0.013611 |    |           |

BLADE FLAP AT STA 205

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 351 FLT 500.0 TR 20

| AJ              | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|-----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.6233336E 04  |                |               |         |         |          | 1  | 4.115     |
| -0.23391421E 04 | 0.4423406E 04  | 0.5224457E 04 | 118.397 | 118.397 | 1.000000 | 2  | 8.230     |
| 0.2377157E 04   | -0.1030837E 04 | 0.2591042E 04 | 330.556 | 168.278 | 0.515276 | 3  | 12.346    |
| -0.7545180E 03  | -0.6047034E 03 | 0.1018880E 04 | 222.223 | 74.074  | 0.202623 | 4  | 16.461    |
| 0.9024978E 03   | 0.2558557E 03  | 0.5333184E 03 | 15.820  | 5.755   | 0.186641 | 5  | 20.576    |
| 0.5552276F 03   | -0.1585509E 03 | 0.5774221E 03 | 344.063 | 68.813  | 0.114831 | 6  | 24.691    |
| 0.4252440E 03   | 0.2126505E 03  | 0.4754712E 03 | 26.568  | 4.428   | 0.094556 | 7  | 28.807    |
| 0.1926094E 03   | 0.1477838E 03  | 0.2427724E 03 | 37.498  | 5.527   | 0.046280 | 8  | 32.922    |
| -0.1546001E 03  | 0.8321667E 02  | 0.1794455E 03 | 152.462 | 19.058  | 0.035795 | 9  | 37.037    |
| -0.1417586E 03  | -0.2431467E 01 | 0.1417737E 03 | 180.983 | 20.109  | 0.026195 | 10 | 41.152    |
| 0.1306260E 03   | -0.6664229E 02 | 0.1324956E 03 | 319.215 | 31.722  | 0.026439 |    |           |

BLADE FLAP AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 351 FLT 500.0 TR 4

| AJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.5504612E 03  |                |               |         |         |          | 1  | 4.115     |
| -0.2677615E 03 | 0.3084639E 04  | 0.3131220E 04 | 94.953  | 94.953  | 1.000000 | 2  | 8.230     |
| 0.1680458E 04  | -0.2373225E 03 | 0.1733074E 04 | 351.990 | 175.995 | 0.549163 | 3  | 12.346    |
| -0.4751479F 03 | -0.5751418E 03 | 0.7437140E 03 | 230.291 | 76.764  | 0.234814 | 4  | 16.461    |
| 0.1152230E 04  | 0.3133604E 03  | 0.1149030E 04 | 15.214  | 5.804   | 0.385036 | 5  | 20.576    |
| 0.3319524E 03  | -0.3203028E 03 | 0.4402361E 03 | 313.305 | 62.661  | 0.141456 | 6  | 24.691    |
| 0.4614540E 03  | 0.7565845E 02  | 0.4630415E 03 | 9.421   | 1.370   | 0.157371 | 7  | 28.807    |
| 0.4388599E 03  | -0.3352974E 03 | 0.3551448E 03 | 322.164 | 46.023  | 0.178364 | 8  | 32.922    |
| 0.7610620E 03  | 0.5720643E 03  | 0.4681536E 03 | 30.220  | 4.527   | 0.312185 | 9  | 37.037    |
| 0.2762047E 03  | -0.2686509E 02 | 0.2777053E 03 | 354.046 | 39.338  | 0.089548 | 10 | 41.152    |
| -0.1235586E 03 | -0.1681647E 03 | 0.2047003E 03 | 233.685 | 23.368  | 0.067296 |    |           |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 32 V= 123 KTS n= 1.24 g

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BLADE FLAP AT STA 270  
HARMONIC ANALYSIS MODEL AM-50A SHIP 1004 T 405 CTR 351 FLT 500.0 TR 26  
OVERALL CYCLIC LOAD = 0.371330E C4

| ZERO POSITION USED | 0.10           | LCAO/IN USED  | 17863.00 |        |          |    |           |  |
|--------------------|----------------|---------------|----------|--------|----------|----|-----------|--|
| AJ                 | HJ             | CJ            | PHIJC    | PSIJC  | CJ/LJMAX | J  | FREQUENCY |  |
| 0.2040474E 04      |                |               |          |        |          |    |           |  |
| 0.1100690E 04      | 0.1020101E 04  | 0.1501343E 04 | 42.833   | 42.833 | 1.000000 | 1  | 4.115     |  |
| 0.4033050E 03      | 0.5623449E C3  | 0.6971343E 03 | 46.103   | 23.052 | 0.461864 | 2  | 8.230     |  |
| -0.6704023E 03     | -0.3040005E C3 | 0.7303591E 03 | 204.435  | 68.145 | 0.487851 | 3  | 12.346    |  |
| 0.0461104E 03      | 0.3421138E 03  | 0.7557427E 03 | 31.253   | 7.813  | 0.500726 | 4  | 16.461    |  |
| 0.1751500E J2      | -0.4303043E 02 | 0.9466440E 02 | 280.063  | 56.133 | 0.062717 | 5  | 20.576    |  |
| -0.3473550E J3     | -0.8635144E C2 | 0.4006085E 03 | 192.259  | 32.043 | 0.264425 | 6  | 24.691    |  |
| 0.1024074E 03      | -0.2702203E C3 | 0.3203103E 03 | 304.093  | 43.442 | 0.216186 | 7  | 28.807    |  |
| 0.9457559E 03      | 0.3454442E C3  | 0.1031659E 04 | 13.233   | 2.404  | 0.663617 | 8  | 32.922    |  |
| 0.2981510E 03      | 0.1265500E C3  | 0.3233970E 03 | 22.499   | 2.555  | 0.214548 | 9  | 37.037    |  |
| -0.5136530E 02     | -0.4745343E 02 | 0.6944507E 02 | 222.722  | 22.272 | 0.046340 | 10 | 41.152    |  |

BLADE CHORD AT STA 103  
HARMONIC ANALYSIS MODEL AM-50A SHIP 1003 T 405 CTR 351 FLT 500.0 TR 17  
OVERALL CYCLIC LOAD = 0.621913E 05

| ZERO POSITION USED | 7.44           | LCAO/IN USED  | -257209.00 |        |          |    |           |
|--------------------|----------------|---------------|------------|--------|----------|----|-----------|
| AJ                 | HJ             | CJ            | PHIJC      | PSIJC  | CJ/LJMAX | J  | FREQUENCY |
| 0.2013374E 04      | 0.4087419E 05  | 0.5154507E 05 | 65.433     | 65.433 | 1.000000 | 1  | 4.115     |
| 0.2142470E 05      | 0.3101371E 04  | 0.6414323E 04 | 52.888     | 26.344 | 0.124435 | 2  | 8.230     |
| 0.3087644E 04      | -0.8582104E 04 | 0.1024392E 05 | 241.201    | 80.420 | 0.198737 | 3  | 12.346    |
| -0.4923400E 04     | 0.2311412E C3  | 0.3549929E 04 | 3.042      | 0.923  | 0.069646 | 4  | 16.461    |
| 0.3502400E 04      | -0.8340277E C2 | 0.4831870E 03 | 354.501    | 70.916 | 0.017154 | 5  | 20.576    |
| 0.8742402E 03      | -0.3040007E C3 | 0.9019720E 03 | 193.743    | 33.124 | 0.018661 | 6  | 24.691    |
| -0.9106602E J3     | -0.5140615E 03 | 0.5201702E 03 | 257.684    | 36.812 | 0.010208 | 7  | 28.807    |
| -0.1122304E 03     | -0.2132717E 03 | 0.3427004E 03 | 321.514    | 40.189 | 0.006649 | 8  | 32.922    |
| 0.2682545E 03      | 0.1132789E C4  | 0.1313738E 04 | 120.834    | 13.426 | 0.025594 | 9  | 37.037    |
| -0.0701842E J3     | 0.2764503E C3  | 0.7023470E 03 | 157.370    | 15.737 | 0.013639 | 10 | 41.152    |

BLADE CHORD AT STA 235  
HARMONIC ANALYSIS MODEL AM-50A SHIP 1004 T 405 CTR 351 FLT 500.0 TR 22  
OVERALL CYCLIC LOAD = 0.110748E C5

| ZERO POSITION USED | 6.31           | LCAO/IN USED  | -64488.00 |        |          |    |           |
|--------------------|----------------|---------------|-----------|--------|----------|----|-----------|
| AJ                 | HJ             | CJ            | PHIJC     | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
| -0.2752574E 05     |                |               |           |        |          |    |           |
| 0.3480006E 04      | 0.6308004E 04  | 0.7204551E 04 | 61.111    | 61.111 | 1.000000 | 1  | 4.115     |
| 0.6479332E J3      | 0.1043365E 04  | 0.1224883E 04 | 58.208    | 29.104 | 0.170704 | 2  | 8.230     |
| -0.1074700E 04     | -0.1225000E C4 | 0.1024960E 04 | 224.739   | 76.246 | 0.226191 | 3  | 12.346    |
| 0.1049249E 04      | -0.1324934E C3 | 0.1037406E 04 | 352.792   | 88.198 | 0.146797 | 4  | 16.461    |
| -0.1360003E 03     | -0.3106752E 03 | 0.3401207E 03 | 246.063   | 44.213 | 0.047210 | 5  | 20.576    |
| -0.4470644E 02     | 0.8471900E C2  | 0.4674104E 02 | 118.868   | 19.811 | 0.013428 | 6  | 24.691    |
| 0.6402070E 01      | -0.5235945E C3 | 0.5236343E 03 | 270.707   | 38.672 | 0.072061 | 7  | 28.807    |
| -0.5552440E 03     | -0.3150001E 03 | 0.6334247E 03 | 209.571   | 26.196 | 0.088615 | 8  | 32.922    |
| -0.2437014E 03     | 0.1127721E C4  | 0.1165339E 04 | 104.548   | 11.022 | 0.161750 | 9  | 37.037    |
| -0.2727524E 03     | -0.4304420E C2 | 0.2761340E 03 | 188.976   | 18.898 | 0.038328 | 10 | 41.152    |

BLADE TORSION AT STA 131.5  
HARMONIC ANALYSIS MODEL AM-50A SHIP 1003 T 405 CTR 351 FLT 500.0 TR 44  
OVERALL CYCLIC LOAD = 0.508516E C4

| LEAD POSITION USED | 1.44           | LCAO/IN USED  | 12705.00 |        |          |    |           |  |
|--------------------|----------------|---------------|----------|--------|----------|----|-----------|--|
| AJ                 | PJ             | CJ            | PHIJC    | PSIJC  | CJ/CJMAX | J  | FREQUENCY |  |
| 0.1573257E 04      |                |               |          |        |          |    |           |  |
| 0.1255473E C4      | 0.1000624E 04  | 0.1650493E 04 | 40.720   | 40.720 | 1.000000 | 1  | 4.115     |  |
| -0.6000806E 03     | 0.6810475E C3  | 0.9081523E 03 | 131.359  | 65.679 | 0.548239 | 2  | 8.230     |  |
| -0.3615547E 03     | 0.5244710E C2  | 0.3653704E 03 | 171.747  | 57.249 | 0.220574 | 3  | 12.346    |  |
| -0.1806403E 02     | -0.1731020E 03 | 0.1749424E 03 | 264.042  | 66.011 | 0.105067 | 4  | 16.461    |  |
| -0.3708307E 03     | -0.1609022E 02 | 0.3712078E 03 | 142.502  | 36.312 | 0.224043 | 5  | 20.576    |  |
| -0.5253300E 03     | -0.5865418E C3 | 0.7674402E 03 | 224.153  | 36.026 | 0.475367 | 6  | 24.691    |  |
| 0.3231040E 03      | -0.4552361E 03 | 0.5913102E 03 | 303.121  | 43.363 | 0.356964 | 7  | 28.807    |  |
| 0.7792324E 03      | 0.1262533E C3  | 0.7499308E 03 | 4.692    | 1.212  | 0.452720 | 8  | 32.922    |  |
| 0.1355442E 03      | 0.2103000E C3  | 0.2353617E 03 | 63.351   | 7.039  | 0.142085 | 9  | 37.037    |  |
| -0.2351043E 02     | -0.2250210E C2 | 0.3344240E 02 | 216.078  | 21.608 | 0.023539 | 10 | 41.152    |  |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 33 V= 123.5 KTS n= 1.4 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-30A SHIP 1009 T 405 CTR 300 FLT 500.0 TR 31

| AJ              | BJ              | CJ             | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|-----------------|-----------------|----------------|---------|---------|----------|----|-----------|
| 0.6700570E 01   | -0.3200005E 01  | 0.3530709E 01  | 324.547 | 324.547 | 1.000000 | 1  | 4.132     |
| 0.4503320E 01   | -0.9293007E -01 | 0.1319721E 00  | 210.712 | 105.356 | 0.032902 | 2  | 8.264     |
| -0.1504442E 00  | 0.0588094E -01  | 0.9643731E -01 | 119.250 | 39.752  | 0.017798 | 3  | 12.397    |
| -0.4810751E -01 | -0.2562373E -01 | 0.9172637E -01 | 341.201 | 85.300  | 0.016621 | 4  | 16.525    |
| 0.8702200E -01  | -0.1037002E -02 | 0.1530255E -02 | 319.444 | 61.884  | 0.000289 | 5  | 20.661    |
| 0.1212795E -02  | -0.2003150E -01 | 0.2403403E -01 | 255.018 | 42.503  | 0.005359 | 6  | 24.793    |
| -0.7062110E -02 | -0.1425234E -01 | 0.1851371E -01 | 230.344 | 32.907  | 0.003347 | 7  | 28.926    |
| -0.1161174E -01 | 0.6222870E -03  | 0.1217743E -01 | 176.788 | 22.099  | 0.002202 | 8  | 33.058    |
| -0.1215835E -01 | -0.1064883E -01 | 0.1533273E -01 | 223.794 | 24.867  | 0.002782 | 9  | 37.190    |
| -0.1110505E -01 | -0.2520627E -02 | 0.1030005E -01 | 194.053 | 19.405  | 0.001677 | 10 | 41.322    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-30A SHIP 1009 T 405 CTR 300 FLT 500.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.5454410E 04 | 0.7224944E 03  | 0.7530438E 05 | 106.280 | 106.280 | 1.000000 | 1  | 4.132     |
| -0.2111100E 03 | -0.1552870E 04 | 0.3322959E 04 | 208.643 | 104.322 | 0.044124 | 2  | 8.264     |
| -0.2910300E 04 | -0.1356121E 03 | 0.3230744E 05 | 204.416 | 68.139  | 0.435036 | 3  | 12.397    |
| -0.2467346E 05 | 0.5030528E 03  | 0.1550762E 04 | 18.962  | 4.740   | 0.020672 | 4  | 16.525    |
| 0.1472202E 04  | 0.1332642E 04  | 0.7748577E 04 | 170.097 | 34.019  | 0.102090 | 5  | 20.661    |
| -0.7633309E 04 | -0.1221007E 02 | 0.2003042E 03 | 336.900 | 56.483  | 0.002664 | 6  | 24.793    |
| 0.1871400E 03  | -0.3520124E 04 | 0.6253344E 04 | 218.821 | 31.260  | 0.083035 | 7  | 28.926    |
| -0.4872059E 04 | -0.8218381E 02 | 0.8411072E 03 | 354.708 | 44.339  | 0.011453 | 8  | 33.058    |
| 0.8873093E 03  | -0.1461185E 04 | 0.1712444E 04 | 301.429 | 33.492  | 0.022738 | 9  | 37.190    |
| 0.8925160E 03  | -0.6355542E 02 | 0.1274003E 03 | 319.781 | 31.978  | 0.001718 | 10 | 41.322    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-30A SHIP 1009 T 405 CTR 300 FLT 500.0 TR 11

| AJ             | BJ              | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|-----------------|---------------|---------|---------|----------|----|-----------|
| -0.5273107E 03 | -0.2256813E 03  | 0.2490330E 03 | 244.980 | 244.980 | 1.000000 | 1  | 4.132     |
| -0.1053344E 03 | -0.9671082E 02  | 0.1407753E 03 | 318.608 | 159.304 | 0.505245 | 2  | 8.264     |
| 0.1022580E 03  | -0.04520704E 02 | 0.1349574E 03 | 201.986 | 67.329  | 0.742241 | 3  | 12.397    |
| -0.1714133E 03 | -0.3149194E 02  | 0.4802225E 02 | 220.979 | 55.245  | 0.192819 | 4  | 16.525    |
| -0.3625455E 02 | -0.1568201E 02  | 0.3057221E 02 | 220.043 | 44.009  | 0.122834 | 5  | 20.661    |
| -0.2342023E 02 | -0.3323421E 02  | 0.7972572E 02 | 335.429 | 55.705  | 0.320919 | 6  | 24.793    |
| 0.7200848E 02  | -0.2245034E 02  | 0.3572536E 02 | 336.020 | 48.003  | 0.221882 | 7  | 28.926    |
| 0.5048830E 02  | 0.1630943E 02   | 0.1832777E 02 | 61.675  | 7.704   | 0.074343 | 8  | 33.058    |
| 0.8790475E 01  | -0.1164278E 02  | 0.2659537E 02 | 205.962 | 22.885  | 0.106786 | 9  | 37.190    |
| -0.2391150E 02 | 0.1064983E 02   | 0.1225113E 02 | 119.623 | 11.962  | 0.049191 | 10 | 41.322    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-30A SHIP 1009 T 405 CTR 300 FLT 500.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2970577E 05  | 0.1406000E 05  | 0.1406570E 05 | 84.109  | 84.109  | 1.000000 | 1  | 4.132     |
| 0.2187334E 03  | -0.8010094E 04 | 0.8955102E 04 | 296.559 | 148.280 | 0.630662 | 2  | 8.264     |
| 0.4004624E 04  | -0.1280083E 04 | 0.5946316E 04 | 192.491 | 64.164  | 0.422625 | 3  | 12.397    |
| -0.5803316E 04 | -0.8614170E 03 | 0.3258820E 04 | 145.527 | 48.832  | 0.231686 | 4  | 16.525    |
| -0.3142508E 04 | 0.5638796E 03  | 0.1547795E 04 | 158.425 | 31.685  | 0.112888 | 5  | 20.661    |
| -0.4003711E 03 | -0.1263264E 04 | 0.1540022E 04 | 249.737 | 41.623  | 0.055757 | 6  | 24.793    |
| 0.2541573E 03  | -0.1211452E 04 | 0.1237833E 04 | 281.850 | 40.264  | 0.088004 | 7  | 28.926    |
| 0.2032522E 04  | -0.9557330E 01 | 0.2032444E 04 | 359.729 | 44.960  | 0.144532 | 8  | 33.058    |
| 0.3402895E 03  | -0.1510035E 03 | 0.3725366E 03 | 335.477 | 37.331  | 0.020486 | 9  | 37.190    |
| 0.3248474E 03  | -0.2242403E 03 | 0.4016848E 03 | 325.201 | 32.520  | 0.028558 | 10 | 41.322    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 33 V= 123.5 KTS n= 1.4 g

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FIXED HUB CHORD AT STA 18  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 366 FLT 500.0 TR 3

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.4121043E 05  |                |               |         |        |          |    |           |
| 0.7651763E 05  | 0.0221700E 05  | 0.1123479E 06 | 47.091  | 47.091 | 1.000000 | 1  | 4.132     |
| 0.4774727E 04  | 0.0401104E 04  | 0.9713414E 04 | 60.563  | 30.262 | 0.080445 | 2  | 8.264     |
| -0.4478145E 04 | -0.1138019E 05 | 0.1222457E 06 | 248.520 | 82.840 | 0.108816 | 3  | 12.397    |
| 0.3212403E 03  | 0.0471335E 03  | 0.1221348E 03 | 63.598  | 15.400 | 0.006424 | 4  | 16.525    |
| -0.3445255E 04 | 0.1120104E 04  | 0.3670340E 04 | 162.231 | 32.446 | 0.032658 | 5  | 20.661    |
| -0.2193404E 04 | -0.4254542E 03 | 0.2244778E 04 | 140.475 | 31.829 | 0.019885 | 6  | 24.793    |
| -0.1518435E 04 | 0.1426149E 04  | 0.2044700E 04 | 136.758 | 14.537 | 0.018545 | 7  | 28.926    |
| 0.1227437E 04  | -0.2046406E 03 | 0.1244378E 04 | 350.534 | 43.817 | 0.011072 | 8  | 33.058    |
| 0.5206150E 03  | -0.3141505E 04 | 0.3184354E 04 | 274.410 | 31.046 | 0.028334 | 9  | 37.190    |
| 0.1477435E 03  | -0.1051715E 04 | 0.1062042E 04 | 277.496 | 27.800 | 0.009450 | 10 | 41.322    |

BLADE FLAP AT STA 130.8  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 366 FLT 500.0 TR 19

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1334423E 05  |                |               |         |         |          |    |           |
| 0.4738531E 04  | -0.3374502E 04 | 0.9817340E 04 | 324.543 | 324.543 | 1.000000 | 1  | 4.132     |
| -0.1437304E 04 | 0.2334448E 04  | 0.3333852E 04 | 129.688 | 64.844  | 0.521484 | 2  | 8.264     |
| 0.1491054E 04  | 0.0774936E 03  | 0.1730051E 04 | 30.474  | 10.158  | 0.247395 | 3  | 12.397    |
| 0.1304459E 04  | 0.1836208E 01  | 0.1304463E 04 | 0.081   | 0.020   | 0.224236 | 4  | 16.525    |
| 0.6638181E 03  | -0.5558044E 03 | 0.0057741E 03 | 323.061 | 64.312  | 0.146827 | 5  | 20.661    |
| 0.0277230E 03  | 0.6551700E 02  | 0.0303718E 03 | 4.525   | 0.754   | 0.142741 | 6  | 24.793    |
| 0.6348574E 03  | -0.0151009E 02 | 0.0433080E 03 | 352.884 | 50.383  | 0.110026 | 7  | 28.926    |
| 0.5800027E 03  | 0.4260474E 03  | 0.7147140E 03 | 36.297  | 4.537   | 0.123714 | 8  | 33.058    |
| -0.1176116E 02 | 0.4265400E 02  | 0.4428451E 02 | 105.401 | 11.711  | 0.007613 | 9  | 37.190    |
| 0.1132440E 03  | 0.1450911E 02  | 0.1141703E 03 | 7.300   | 0.730   | 0.019629 | 10 | 41.322    |

BLADE FLAP AT STA 205  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 366 FLT 500.0 TR 23

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.0003125E 04 |                |               |         |         |          |    |           |
| -0.2000710E 04 | 0.4750160E 04  | 0.5401344E 04 | 119.397 | 119.397 | 1.000000 | 1  | 4.132     |
| 0.2669784E 04  | -0.1272675E 04 | 0.2437013E 04 | 334.513 | 167.256 | 0.541553 | 2  | 8.264     |
| -0.0205876E 03 | -0.7323137E 03 | 0.9637942E 03 | 229.449 | 76.483  | 0.176475 | 3  | 12.397    |
| 0.1373265E 04  | 0.2579402E 03  | 0.1397378E 04 | 10.657  | 2.059   | 0.255867 | 4  | 16.525    |
| 0.0017647E 03  | -0.3932117E 03 | 0.4472529E 03 | 335.474 | 67.095  | 0.173447 | 5  | 20.661    |
| 0.6430557E 03  | 0.1533091E 03  | 0.6011167E 03 | 13.409  | 2.235   | 0.121054 | 6  | 24.793    |
| 0.1532600E 03  | 0.2051412E 03  | 0.2542471E 03 | 53.762  | 7.680   | 0.047475 | 7  | 28.926    |
| -0.1048979E 03 | 0.3217705E 03  | 0.3633704E 03 | 117.635 | 14.729  | 0.060026 | 8  | 33.058    |
| -0.1542505E 03 | -0.3432237E 01 | 0.1542505E 03 | 181.272 | 20.141  | 0.028307 | 9  | 37.190    |
| 0.1657440E 03  | 0.7260242E 02  | 0.1444510E 03 | 21.365  | 2.137   | 0.036520 | 10 | 41.322    |

BLADE FLAP AT STA 235  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 366 FLT 500.0 TR 4

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1404742E 04  |                |               |         |         |          |    |           |
| -0.5144014E 03 | 0.3410440E 04  | 0.3444880E 04 | 48.668  | 48.668  | 1.000000 | 1  | 4.132     |
| -0.1404040E 04 | -0.4016745E 03 | 0.1933801E 04 | 342.983 | 172.992 | 0.551805 | 2  | 8.264     |
| -0.9336470E 01 | -0.6150820E 03 | 0.0151524E 03 | 204.130 | 84.710  | 0.178311 | 3  | 12.397    |
| 0.1390472E 04  | 0.1500412E 03  | 0.1349786E 04 | 6.433   | 1.608   | 0.405749 | 4  | 16.525    |
| 0.7067031E 03  | -0.4466875E 03 | 0.0377243E 03 | 327.777 | 65.555  | 0.242628 | 5  | 20.661    |
| 0.8047034E 03  | -0.3144646E 03 | 0.3625180E 03 | 338.702 | 50.404  | 0.250014 | 6  | 24.793    |
| 0.7466487E 03  | -0.5234170E 03 | 0.4532544E 03 | 326.040 | 40.671  | 0.276315 | 7  | 28.926    |
| 0.1534661E 04  | 0.7333652E 03  | 0.1733346E 04 | 25.469  | 3.184   | 0.444335 | 8  | 33.058    |
| 0.2444090E 03  | 0.1130497E 03  | 0.3238115E 03 | 20.757  | 2.306   | 0.042992 | 9  | 37.190    |
| -0.7301504E 02 | -0.4153238E 02 | 0.1170495E 03 | 231.419 | 23.142  | 0.033940 | 10 | 41.322    |



# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 33 V= 123.5 KTS n= 1.4 g**

BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AM-56A SHIP 1309 T 405 CTR 366 FLT 500.0 TR 26

| AJ            | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|---------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.4109C35E 04 |                |               |         |        |          |    |           |
| 0.1215119E 04 | 0.1414129E 04  | 0.2020377E 04 | 53.027  | 53.027 | 1.000000 | 1  | 4.132     |
| 0.7910594E 03 | 0.2153760E 03  | 0.4198933E 03 | 15.230  | 7.618  | 0.409812 | 2  | 8.264     |
| 0.7260152E 02 | -0.8801123E 03 | 0.8910813E 03 | 274.678 | 91.559 | 0.441047 | 3  | 12.397    |
| 0.1004101E 04 | 0.2237596E 03  | 0.1047372E 04 | 11.675  | 2.969  | 0.538202 | 4  | 16.525    |
| 0.4336540E 03 | -0.1564949E 03 | 0.4591517E 03 | 340.602 | 68.160 | 0.227280 | 5  | 20.661    |
| 0.1602121E 03 | -0.2516821E 03 | 0.3329446E 03 | 248.772 | 49.795 | 0.164818 | 6  | 24.793    |
| 0.5890354E 03 | -0.7789421E 03 | 0.9773034E 03 | 307.134 | 43.876 | 0.463605 | 7  | 28.926    |
| 0.1842350E 04 | 0.1552642E 03  | 0.1852632E 04 | 6.053   | 0.757  | 0.916599 | 8  | 33.058    |
| 0.5285700E 03 | -0.1064767E 03 | 0.5331842E 03 | 348.611 | 38.734 | 0.266875 | 9  | 37.190    |
| 0.2210437E 02 | 0.5080890E 02  | 0.0035786E 02 | 68.739  | 6.874  | 0.030172 | 10 | 41.322    |

BLADE CHORD AT STA 103

HARMONIC ANALYSIS MODEL AM-56A SHIP 1309 T 405 CTR 366 FLT 500.0 TR 17

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2031530E 06  |                |               |         |        |          |    |           |
| 0.3115093E 05  | 0.4388876E 05  | 0.3360062E 05 | 54.505  | 54.505 | 1.000000 | 1  | 4.132     |
| 0.5637C51F 04  | 0.5188195E 04  | 0.7661180E 04 | 42.626  | 21.313 | 0.142771 | 2  | 8.264     |
| -0.6779559E 04 | -0.7899234E 04 | 0.1340983E 05 | 229.362 | 76.454 | 0.193990 | 3  | 12.397    |
| 0.2280184E 04  | -0.5382891E 03 | 0.2343700E 04 | 340.751 | 86.688 | 0.044770 | 4  | 16.525    |
| -0.8727170E 03 | 0.1438515E 04  | 0.2125500E 04 | 114.237 | 22.847 | 0.039618 | 5  | 20.661    |
| 0.1170590E 03  | 0.3024131E 03  | 0.3608013E 03 | 72.094  | 12.010 | 0.007098 | 6  | 24.793    |
| 0.7280350E 03  | -0.1684410E 04 | 0.1823510E 04 | 293.507 | 41.941 | 0.035426 | 7  | 28.926    |
| 0.1620477E 03  | -0.4547691E 03 | 0.4043442E 03 | 280.265 | 35.033 | 0.016446 | 8  | 33.058    |
| -0.1309115E 02 | 0.1656309E 04  | 0.1630363E 04 | 90.433  | 10.050 | 0.030867 | 9  | 37.190    |
| -0.1427170E 03 | 0.6300110E 03  | 0.6525131E 03 | 102.636 | 10.264 | 0.012158 | 10 | 41.322    |

BLADE CHORD AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1309 T 405 CTR 366 FLT 500.0 TR 22

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.2057149E 05 |                |               |         |        |          |    |           |
| 0.5015629E 04  | 0.5550922E 04  | 0.7461262E 04 | 47.900  | 47.900 | 1.000000 | 1  | 4.132     |
| 0.1430794E 04  | 0.7541653E 03  | 0.1630423E 04 | 29.033  | 14.516 | 0.218730 | 2  | 8.264     |
| -0.1447537E 04 | -0.5458646E 03 | 0.1731707E 04 | 215.266 | 71.089 | 0.231473 | 3  | 12.397    |
| 0.6461079E 03  | -0.2231381E 03 | 0.6835540E 03 | 340.947 | 85.237 | 0.041364 | 4  | 16.525    |
| -0.2002222E 03 | 0.4565339E 02  | 0.2099340E 03 | 167.155 | 33.831 | 0.035416 | 5  | 20.661    |
| 0.1059351E 03  | -0.5240000E 02 | 0.1181366E 03 | 333.681 | 55.813 | 0.015798 | 6  | 24.793    |
| -0.4008757E 03 | -0.1002217E 04 | 0.1082413E 04 | 247.606 | 35.401 | 0.144683 | 7  | 28.926    |
| -0.3402607E 03 | -0.7516135E 03 | 0.8275331E 03 | 245.265 | 30.658 | 0.110615 | 8  | 33.058    |
| 0.6597004E 03  | 0.1415137E 04  | 0.1501351E 04 | 65.006  | 7.223  | 0.208701 | 9  | 37.190    |
| -0.1577605E 03 | -0.1452081E 03 | 0.2144143E 03 | 222.628 | 22.263 | 0.028660 | 10 | 41.322    |

BLADE TORSION AT STA 131.3

HARMONIC ANALYSIS MODEL AM-56A SHIP 1309 T 405 CTR 366 FLT 500.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.5177139E 03  |                |               |         |         |          |    |           |
| 0.2300664E 04  | 0.2341540E 04  | 0.3242840E 04 | 45.503  | 45.503  | 1.000000 | 1  | 4.132     |
| -0.5253507E 03 | 0.8503416E 03  | 0.3995400E 03 | 121.709 | 63.854  | 0.304474 | 2  | 8.264     |
| 0.4173513E 03  | -0.4127422E 03 | 0.5870083E 03 | 315.314 | 105.105 | 0.178811 | 3  | 12.397    |
| -0.4931236E 03 | 0.4151748E 02  | 0.9321797E 03 | 177.423 | 44.356  | 0.285955 | 4  | 16.525    |
| -0.5785540E 03 | 0.4716045E 03  | 0.7464460E 03 | 140.817 | 29.163  | 0.227378 | 5  | 20.661    |
| -0.1053479E 04 | 0.2057500E 03  | 0.1373333E 04 | 168.944 | 28.158  | 0.320968 | 6  | 24.793    |
| 0.2715370E 03  | -0.7265125E 03 | 0.7755440E 03 | 290.493 | 41.499  | 0.236258 | 7  | 28.926    |
| 0.1330220E 03  | -0.7150323E 03 | 0.1510861E 04 | 331.728 | 41.466  | 0.460230 | 8  | 33.058    |
| 0.1415042E 03  | -0.1274338E 03 | 0.1404278E 03 | 317.395 | 35.333  | 0.058007 | 9  | 37.190    |
| 0.7550564E 02  | -0.8681403E 00 | 0.7551065E 02 | 359.341 | 35.934  | 0.025002 | 10 | 41.322    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 34 V= 121 KTS n= 1.5 g

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BLADE FEATHER ANGLE  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 370 FLT 500.0 TR 31

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.0227459F 01  |                |               |         |         |          | 1  | 4.132     |
| 0.5021003E 01  | -0.2540007E 01 | 0.5029893E 01 | 333.106 | 333.106 | 1.000000 | 2  | 8.264     |
| -0.7005244E-01 | -0.1063172F 00 | 0.1277034E 00 | 236.319 | 118.160 | 0.022694 | 3  | 12.397    |
| -0.1314540E-01 | 0.7353723E-01  | 0.7471164E-01 | 100.173 | 33.391  | 0.015271 | 4  | 16.525    |
| 0.7520224F-01  | -0.0674550F-01 | 0.4070293E-01 | 321.047 | 80.262  | 0.017177 | 5  | 20.661    |
| 0.4476547F-02  | 0.1483572E-01  | 0.1549638E-01 | 73.209  | 14.642  | 0.002753 | 6  | 24.793    |
| 0.1544735E-01  | 0.5754709E-02  | 0.1044445E-01 | 20.432  | 3.405   | 0.002928 | 7  | 28.926    |
| 0.4336486E-01  | -0.2653552E-01 | 0.5043303E-01 | 324.537 | 40.734  | 0.009030 | 8  | 33.056    |
| -0.4000574E-01 | 0.5803518E-02  | 0.4051231E-01 | 171.678 | 21.460  | 0.007196 | 9  | 37.190    |
| 0.3916523E-02  | 0.2404291E-01  | 0.2430013E-01 | 80.742  | 8.971   | 0.004327 | 10 | 41.322    |
| 0.1298895E-01  | 0.6610218E-02  | 0.1457422E-01 | 26.972  | 2.697   | 0.002589 |    |           |

SHAFT MOMENT  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 370 FLT 500.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.7442180E 04 |                |               |         |         |          | 1  | 4.132     |
| -0.1004551E 05 | 0.7347440E 05  | 0.7534864E 05 | 102.805 | 102.805 | 1.000000 | 2  | 8.264     |
| -0.3028435E 04 | -0.3787697E 04 | 0.4849543E 04 | 231.356 | 115.678 | 0.064361 | 3  | 12.397    |
| -0.3463210F 05 | -0.1354714E 05 | 0.3719311E 05 | 201.361 | 67.120  | 0.443613 | 4  | 16.525    |
| 0.1564478E 04  | -0.4260080E 03 | 0.1621000E 04 | 344.747 | 86.187  | 0.021521 | 5  | 20.661    |
| -0.9738000E 04 | -0.1764674E 04 | 0.4474432E 04 | 190.300 | 38.360  | 0.131350 | 6  | 24.793    |
| 0.8115124E 03  | -0.1158142E 04 | 0.1412502E 04 | 305.064 | 50.844  | 0.016747 | 7  | 28.926    |
| -0.2713405E 04 | -0.5164500F 04 | 0.5733803E 04 | 242.007 | 34.572  | 0.070721 | 8  | 33.056    |
| 0.3002783E 03  | -0.4222440E 03 | 0.4649877E 03 | 288.035 | 36.004  | 0.012872 | 9  | 37.190    |
| 0.5505134E 03  | -0.1615342E 04 | 0.1706612E 04 | 288.819 | 32.071  | 0.022650 | 10 | 41.322    |
| 0.1121535E 04  | -0.5500934E 03 | 0.1244800E 04 | 333.856 | 33.386  | 0.016587 |    |           |

PITCH LINK TENSION  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 370 FLT 500.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.0010076E 03 |                |               |         |         |          | 1  | 4.132     |
| -0.1320159E 03 | -0.2418200E 03 | 0.2753936E 03 | 241.223 | 241.223 | 1.000000 | 2  | 8.264     |
| 0.5461204E 02  | -0.1022743E 03 | 0.1103106E 03 | 243.187 | 143.094 | 0.420599 | 3  | 12.397    |
| -0.1949518F 03 | -0.2415550E 02 | 0.2020603E 03 | 188.246 | 62.765  | 0.732407 | 4  | 16.525    |
| -0.2932600F 02 | -0.5587524E 02 | 0.6313355E 02 | 242.307 | 60.577  | 0.228724 | 5  | 20.661    |
| -0.2134328F 02 | -0.2517111F 02 | 0.3300182E 02 | 229.704 | 45.941  | 0.119618 | 6  | 24.793    |
| 0.6764414E 02  | -0.3736757E 02 | 0.7740585E 02 | 331.142 | 55.190  | 0.280774 | 7  | 28.926    |
| 0.4772402E 02  | -0.1385843E 02 | 0.4444023E 02 | 343.808 | 44.115  | 0.180128 | 8  | 33.056    |
| 0.7633035E 01  | 0.2534957F 02  | 0.2631213E 02 | 73.267  | 4.158   | 0.090396 | 9  | 37.190    |
| -0.7253124E 01 | -0.1430107E 02 | 0.2001040E 02 | 249.404 | 27.712  | 0.074735 | 10 | 41.322    |
| 0.8152747E 01  | 0.1058392F 02  | 0.1357845E 02 | 53.416  | 5.342   | 0.044581 |    |           |

FIXED HUB FLAP AT STA 18  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 370 FLT 500.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.3240031E 05  |                |               |         |         |          | 1  | 4.132     |
| 0.3445636E 04  | 0.1472809E 05  | 0.1512578E 05 | 76.832  | 76.832  | 1.000000 | 2  | 8.264     |
| 0.3559567E 04  | -0.9084270E 04 | 0.5756410E 04 | 291.399 | 145.700 | 0.645052 | 3  | 12.397    |
| -0.0518348E 04 | 0.5447780E 03  | 0.6541070E 04 | 175.223 | 58.408  | 0.432445 | 4  | 16.525    |
| -0.3192563E 04 | -0.7631587E 03 | 0.3282310E 04 | 193.444 | 48.361  | 0.217014 | 5  | 20.661    |
| -0.1361353E 04 | 0.1020095E 04  | 0.1717187E 04 | 143.555 | 26.711  | 0.113527 | 6  | 24.793    |
| -0.2970330E 03 | -0.1475541E 04 | 0.1503514E 04 | 258.618 | 43.103  | 0.059508 | 7  | 28.926    |
| 0.5319014E 03  | -0.5752925E 03 | 0.1110737E 04 | 248.607 | 42.658  | 0.073445 | 8  | 33.056    |
| 0.1730205E 04  | -0.1847467E 03 | 0.1740040E 04 | 353.905 | 44.238  | 0.115038 | 9  | 37.190    |
| 0.3242217E 03  | -0.5418321E 02 | 0.3287180E 03 | 350.512 | 36.946  | 0.021732 | 10 | 41.322    |
| 0.3206904E 03  | -0.3663232E 02 | 0.3227755E 03 | 353.483 | 35.348  | 0.021339 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 34 V= 121 KTS n= 1.5 g

FIXED HUB CHORD AT STA 18  
HARMONIC ANALYSIS MODEL AM-36A SHIP 1009 T 405 CTR 370 FLT 500.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2220446E 05  |                |               |         |        |          |    |           |
| 0.8325050E 05  | 0.9217775E 05  | 0.1242070E 06 | 47.913  | 47.913 | 1.000000 | 1  | 4.132     |
| -0.4465715E 04 | 0.9637492E 04  | 0.1044157E 05 | 117.260 | 58.640 | 0.087486 | 2  | 8.264     |
| -0.5322582E 04 | -0.8770000E 04 | 0.1020393E 05 | 238.698 | 79.566 | 0.082636 | 3  | 12.397    |
| -0.7129131E 03 | 0.3712256E 03  | 0.3037144E 03 | 152.493 | 38.123 | 0.006471 | 4  | 16.525    |
| -0.3501561E 04 | 0.4737224E 03  | 0.3533957E 04 | 172.296 | 34.459 | 0.028451 | 5  | 20.661    |
| -0.1674474E 04 | 0.7588455E 03  | 0.2022437E 04 | 157.963 | 20.327 | 0.016283 | 6  | 24.793    |
| -0.2490556E 04 | 0.2159865E 03  | 0.2438340E 04 | 175.869 | 25.124 | 0.024140 | 7  | 28.926    |
| 0.1734446E 04  | -0.1632340E 04 | 0.2331810E 04 | 310.738 | 34.592 | 0.019170 | 8  | 33.058    |
| -0.1644049E 04 | -0.2850141E 04 | 0.3230345E 04 | 240.022 | 20.669 | 0.026491 | 9  | 37.190    |
| -0.3234441E 03 | -0.1374947E 04 | 0.1412471E 04 | 256.763 | 25.676 | 0.011372 | 10 | 41.322    |

BLADE FLAP AT STA 130.5  
HARMONIC ANALYSIS MODEL AM-36A SHIP 1009 T 405 CTR 370 FLT 500.0 TR 19

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1305600E 05  |                |               |         |         |          |    |           |
| 0.5418344E 04  | -0.3451246E 04 | 0.6445742E 04 | 327.204 | 327.204 | 1.000000 | 1  | 4.132     |
| -0.1641557E 04 | 0.2068020E 04  | 0.2610392E 04 | 128.449 | 64.224  | 0.409465 | 2  | 8.264     |
| 0.1700564E 04  | 0.3657725E 03  | 0.1793551E 04 | 11.734  | 3.911   | 0.279024 | 3  | 12.397    |
| 0.1548514E 04  | -0.1641377E 03 | 0.1607343E 04 | 353.961 | 88.490  | 0.244442 | 4  | 16.525    |
| 0.7483105E 03  | -0.6026621E 03 | 0.9008174E 03 | 321.153 | 64.231  | 0.149062 | 5  | 20.661    |
| 0.8744342E 03  | -0.1335654E 03 | 0.8403173E 03 | 351.309 | 53.561  | 0.136078 | 6  | 24.793    |
| 0.6617517E 03  | -0.4000900E 02 | 0.6629245E 03 | 350.641 | 50.947  | 0.105950 | 7  | 28.926    |
| 0.6140567E 03  | 0.5630461E 03  | 0.4407337E 03 | 43.514  | 5.439   | 0.131373 | 8  | 33.058    |
| 0.1438212E 03  | 0.2594243E 02  | 0.1455546E 03 | 352.377 | 34.153  | 0.030339 | 9  | 37.190    |
| 0.2812764E 03  | -0.1225500E 03 | 0.3003155E 03 | 336.457 | 33.646  | 0.047600 | 10 | 41.322    |

BLADE FLAP AT STA 205  
HARMONIC ANALYSIS MODEL AM-36A SHIP 1009 T 405 CTR 370 FLT 500.0 TR 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.5866696E 04 |                |               |         |         |          |    |           |
| -0.2322663E 04 | 0.4881141E 04  | 0.5444621E 04 | 117.332 | 117.332 | 1.000000 | 1  | 4.132     |
| 0.2336404E 04  | -0.5664722E 03 | 0.2526121E 04 | 337.653 | 168.826 | 0.454744 | 2  | 8.264     |
| -0.5245872E 03 | -0.2523501E 03 | 0.6005498E 03 | 209.131 | 69.710  | 0.109296 | 3  | 12.397    |
| 0.1326667E 04  | 0.2427465E 03  | 0.1343889E 04 | 10.367  | 2.592   | 0.245493 | 4  | 16.525    |
| 0.8666245E 03  | -0.1767732E 03 | 0.4021132E 03 | 348.649 | 64.740  | 0.164182 | 5  | 20.661    |
| 0.5806232E 03  | 0.1400051E 03  | 0.6133037E 03 | 18.648  | 3.108   | 0.111564 | 6  | 24.793    |
| 0.1249064E 03  | 0.1673172E 03  | 0.2087431E 03 | 53.256  | 7.608   | 0.038000 | 7  | 28.926    |
| -0.5153624E 02 | 0.1517666E 03  | 0.1485710E 03 | 105.043 | 13.130  | 0.036139 | 8  | 33.058    |
| -0.9451253E 02 | -0.1221916E 03 | 0.1575666E 03 | 230.841 | 25.649  | 0.028080 | 9  | 37.190    |
| 0.2053669E 03  | -0.1425516E 03 | 0.2434991E 03 | 325.234 | 32.523  | 0.045498 | 10 | 41.322    |

BLADE FLAP AT STA 235  
HARMONIC ANALYSIS MODEL AM-36A SHIP 1009 T 405 CTR 370 FLT 500.0 TR 4

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2653730E 04  |                |               |         |        |          |    |           |
| -0.4646022E 02 | 0.3727408E 04  | 0.1727763E 04 | 90.722  | 90.722 | 1.000000 | 1  | 4.132     |
| 0.1699071E 04  | 0.1798246E 02  | 0.1699186E 04 | 0.606   | 0.303  | 0.455814 | 2  | 8.264     |
| -0.7174442E 02 | -0.5300586E 03 | 0.5344472E 03 | 262.286 | 87.429 | 0.143491 | 3  | 12.397    |
| 0.1367505E 04  | 0.1394949E 03  | 0.1374642E 04 | 5.841   | 1.960  | 0.368758 | 4  | 16.525    |
| 0.6800126E 03  | -0.4016768E 03 | 0.7837652E 03 | 324.430 | 65.866 | 0.211866 | 5  | 20.661    |
| 0.6622898E 03  | -0.4401343E 03 | 0.7452014E 03 | 320.393 | 54.397 | 0.213314 | 6  | 24.793    |
| 0.6632312E 03  | -0.5750933E 03 | 0.3774428E 03 | 317.071 | 45.582 | 0.235488 | 7  | 28.926    |
| 0.1478556E 04  | 0.5162461E 03  | 0.1367130E 04 | 14.311  | 2.414  | 0.420394 | 8  | 33.058    |
| 0.1836844E 03  | -0.4053265E 02 | 0.1666331E 03 | 346.092 | 38.455 | 0.045237 | 9  | 37.190    |
| -0.1524545E 03 | 0.1307862E 03  | 0.2006666E 03 | 139.375 | 13.937 | 0.053884 | 10 | 41.322    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 34 V= 121 KTS n= 1.5 g

BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 370 FLT 500.0 TR 26

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.4073275E 04  |                |               |         |        |          | 1  | 4.132     |
| 0.1626800E 04  | 0.15C7490E C4  | 0.2217433E 04 | 42.820  | 42.820 | 1.000000 | 2  | 8.264     |
| 0.6047647E 03  | 0.4765854E 03  | 0.817905E 03  | 35.637  | 17.818 | 0.368806 | 3  | 12.397    |
| -0.7701702E 02 | -0.6614087E C3 | 0.8004438E 03 | 263.312 | 87.771 | 0.300486 | 4  | 16.525    |
| 0.1130514E 04  | 0.1C58533E 03  | 0.1135433E 04 | 5.550   | 1.388  | 0.512127 | 5  | 20.661    |
| 0.3574731E 03  | -0.2C8410E 03  | 0.4137949E 03 | 324.736 | 65.451 | 0.186572 | 6  | 24.793    |
| 0.1880106E 03  | -0.3C37703E C3 | 0.3471305E 03 | 248.446 | 49.824 | 0.158517 | 7  | 28.926    |
| 0.8305134E 03  | -0.3587690E C3 | 0.1340143E 04 | 324.854 | 40.408 | 0.466980 | 8  | 33.058    |
| 0.1540525E 04  | 0.4214304E 03  | 0.1537315E 04 | 15.290  | 1.912  | 0.740288 | 9  | 37.190    |
| 0.1940251E 03  | 0.8181494E 02  | 0.2135092E 03 | 22.884  | 2.540  | 0.044441 | 10 | 41.322    |
| -0.1400580E 03 | 0.1C70498E 03  | 0.218488E 03  | 150.466 | 15.047 | 0.046511 |    |           |

BLADE CHORD AT STA 103

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 370 FLT 500.0 TR 17

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1943782E 04  |                |               |         |        |          | 1  | 4.132     |
| 0.3270525E 05  | 0.4535035E 05  | 0.5925073E 05 | 56.400  | 56.400 | 1.000000 | 2  | 8.264     |
| -0.1232C79L 04 | 0.3839947E 04  | 0.4332707E 04 | 107.784 | 53.893 | 0.068063 | 3  | 12.397    |
| -0.7234678E 04 | -0.60C7678E C4 | 0.940340E 04  | 219.709 | 73.238 | 0.158705 | 4  | 16.525    |
| 0.3884220E 04  | -0.1463542L 04 | 0.3942513E 04 | 339.143 | 84.786 | 0.068335 | 5  | 20.661    |
| 0.2448267E 04  | 0.2624175E C3  | 0.2462291E 04 | 6.118   | 1.224  | 0.041557 | 6  | 24.793    |
| -0.9727C65E 03 | -0.9C95676E C3 | 0.1331717E 04 | 223.374 | 37.180 | 0.022476 | 7  | 28.926    |
| 0.5449C87E 03  | -0.1727371E C4 | 0.1811233E 04 | 287.508 | 41.973 | 0.030570 | 8  | 33.058    |
| 0.9144565E 02  | -0.8084845E 02 | 0.1220933E 03 | 318.335 | 39.817 | 0.002061 | 9  | 37.190    |
| -0.8030554E 03 | 0.1344764E 04  | 0.1535406E 04 | 114.752 | 12.753 | 0.025921 | 10 | 41.322    |
| -0.6067506E 03 | 0.1020877E C3  | 0.0725500E 03 | 171.269 | 17.127 | 0.011351 |    |           |

BLADE CHORD AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 370 FLT 500.0 TR 22

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.2344414E 05 |                |               |         |        |          | 1  | 4.132     |
| 0.5021846E 04  | 0.6555195E C4  | 0.4943023E 04 | 51.053  | 51.053 | 1.000000 | 2  | 8.264     |
| 0.5830354E 03  | 0.9405571E C3  | 0.1136006E 04 | 58.206  | 29.103 | 0.123740 | 3  | 12.397    |
| -0.1811314E 04 | -0.8024005E C3 | 0.1931094E 04 | 203.893 | 87.784 | 0.221523 | 4  | 16.525    |
| 0.8401C79E 03  | -0.3292432E 03 | 0.90232C6E 03 | 338.549 | 84.650 | 0.100897 | 5  | 20.661    |
| 0.6400580E 03  | -0.3357446E C3 | 0.7223076E 03 | 332.322 | 66.464 | 0.080824 | 6  | 24.793    |
| -0.4746300E 02 | -0.1545052E C3 | 0.2044745E 03 | 256.591 | 42.765 | 0.022886 | 7  | 28.926    |
| 0.3101555E 03  | -0.4418484L C3 | 0.1913121E 03 | 288.229 | 41.175 | 0.110881 | 8  | 33.058    |
| -0.5504590E 03 | -0.5048607E C3 | 0.7407534E 03 | 222.524 | 27.816 | 0.083524 | 9  | 37.190    |
| 0.4100416E C3  | 0.1203774E C4  | 0.1271171E 04 | 71.156  | 7.706  | 0.142431 | 10 | 41.322    |
| -0.7781424E 02 | 0.3339412E C3  | 0.3424360E 03 | 103.115 | 10.312 | 0.038347 |    |           |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 370 FLT 500.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.7187747E 03  |                |               |         |         |          | 1  | 4.132     |
| 0.2364518E 04  | 0.2552338E 04  | 0.3508727E 04 | 47.631  | 47.631  | 1.000000 | 2  | 8.264     |
| -0.4730137E 03 | 0.83C3730E C3  | 0.4558470E 03 | 119.668 | 59.834  | 0.272363 | 3  | 12.397    |
| 0.5547624E 03  | -0.4255076E 03 | 0.6971335E 03 | 322.511 | 107.504 | 0.197262 | 4  | 16.525    |
| -0.8846189E 03 | -0.5684925E C2 | 0.8384333E 03 | 183.664 | 45.916  | 0.252636 | 5  | 20.661    |
| -0.5764100L 03 | 0.4050724E 02  | 0.5763142E 03 | 175.730 | 35.186  | 0.164252 | 6  | 24.793    |
| -0.7750446E 03 | -0.2572858E C3 | 0.4334378E 03 | 203.886 | 33.481  | 0.237647 | 7  | 28.926    |
| 0.5724204E 03  | -0.6234730E C3 | 0.4734023E 03 | 310.832 | 44.405  | 0.244510 | 8  | 33.058    |
| 0.1486671E 04  | -0.6724048E 02 | 0.1433143E 04 | 357.414 | 44.877  | 0.424709 | 9  | 37.190    |
| 0.1106000E 03  | -0.1167278E C3 | 0.1034043E 03 | 313.458 | 34.429  | 0.045831 | 10 | 41.322    |
| -0.1334803E 02 | -0.7434328E 02 | 0.7511550E 02 | 262.043 | 26.204  | 0.021408 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 35 V= 122.5 KTS n= 1.55 g

## FLARE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-56A SHIP 1309 T 405 CTR 405 FLT 500.0 TR 31

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.7129143E C1  |                |               |         |         |          | 1  | 4.115     |
| 0.4776320E U1  | -0.3633175E C1 | 0.6001250E U1 | 322.742 | 322.742 | 1.000000 | 2  | 8.230     |
| -0.8181340E-U1 | -0.1386440E C2 | 0.1342640E U1 | 234.069 | 119.544 | 0.026538 | 3  | 12.346    |
| 0.3157211E-U2  | 0.6707547E-C1  | 0.6714924E-U1 | 87.322  | 29.107  | 0.011184 | 4  | 16.461    |
| 0.4634885E-U1  | 0.1516913E-U1  | 0.4881352E-U1 | 14.104  | 4.526   | 0.008134 | 5  | 20.576    |
| 0.2357648E-C1  | 0.2760323E-U1  | 0.1630130E-U1 | 44.449  | 4.400   | 0.006044 | 6  | 24.691    |
| -0.1044805E-U1 | -0.0580944E-U2 | 0.1237073E-U1 | 212.081 | 35.347  | 0.002065 | 7  | 28.807    |
| -0.2634750E-U2 | -0.5035823E-C1 | 0.3042711E-U1 | 267.005 | 38.144  | 0.008403 | 8  | 32.922    |
| -0.1295672E-U1 | 0.1223244E-C1  | 0.3596325E-U1 | 116.324 | 14.541  | 0.005493 | 9  | 37.037    |
| 0.2666555E-U1  | 0.2644150E-C1  | 0.4237432E-U1 | 34.567  | 4.340   | 0.007061 | 10 | 41.152    |
| -0.3043676E-U3 | -0.5438857E-C2 | 0.5447303E-U2 | 266.797 | 26.680  | 0.000908 |    |           |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-56A SHIP 1309 T 405 CTR 405 FLT 500.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1308790E U3 |                |               |         |         |          | 1  | 4.115     |
| -0.1274423E U3 | 0.6754750E U5  | 0.6674884E U5 | 100.722 | 100.722 | 1.000000 | 2  | 8.230     |
| -0.2500450E U4 | -0.4501512E U4 | 0.5149334E U4 | 240.949 | 120.475 | 0.074847 | 3  | 12.346    |
| -0.4804003E U5 | -0.4446617E U4 | 0.4870608E U5 | 191.182 | 63.727  | 0.711780 | 4  | 16.461    |
| 0.2367563E U4  | 0.4476542E C3  | 0.2434936E U4 | 15.247  | 3.824   | 0.035683 | 5  | 20.576    |
| -0.3644445E U4 | 0.1025534E U5  | 0.1388547E U5 | 104.541 | 21.918  | 0.158222 | 6  | 24.691    |
| 0.1640344E U4  | -0.1156043E U4 | 0.2011872E U4 | 324.428 | 54.155  | 0.024243 | 7  | 28.807    |
| -0.1478406E U4 | -0.1437872E C4 | 0.2082314E U4 | 224.204 | 32.024  | 0.024476 | 8  | 32.922    |
| -0.1474406E U2 | -0.5407449E C3 | 0.3404490E U3 | 268.438 | 33.555  | 0.007863 | 9  | 37.037    |
| -0.3075450E U3 | 0.3061644E C4  | 0.3315341E U4 | 264.677 | 27.404  | 0.048148 | 10 | 41.152    |
| -0.5581802E U2 | -0.6750486E C3 | 0.6011354E U3 | 265.301 | 26.533  | 0.004403 |    |           |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-56A SHIP 1309 T 405 CTR 405 FLT 500.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.3391340E U3 |                |               |         |         |          | 1  | 4.115     |
| -0.1035587E U3 | -0.4343250E C3 | 0.4460502E U3 | 256.584 | 256.584 | 1.000000 | 2  | 8.230     |
| -0.3501640E C2 | -0.6458647E C2 | 0.7410739E U2 | 241.273 | 120.637 | 0.165475 | 3  | 12.346    |
| -0.2706374E U3 | 0.4458252E C2  | 0.2325597E U3 | 161.124 | 53.708  | 0.654781 | 4  | 16.461    |
| -0.2437244E U2 | 0.2410844E C2  | 0.3313327E U2 | 134.930 | 34.482  | 0.085465 | 5  | 20.576    |
| 0.2556725E U2  | -0.4554375E C1 | 0.2370971E U2 | 349.400 | 64.480  | 0.058163 | 6  | 24.691    |
| -0.1790444E U2 | 0.1405100E U3  | 0.1217510E U3 | 262.041 | 43.673  | 0.240615 | 7  | 28.807    |
| -0.1668550E U2 | -0.7122021E C2 | 0.7314471E U2 | 256.814 | 36.688  | 0.163827 | 8  | 32.922    |
| 0.8004554E U1  | 0.2281530E C2  | 0.2417680E U2 | 70.667  | 8.633   | 0.054152 | 9  | 37.037    |
| -0.1534807E U1 | 0.2670880E C2  | 0.2681270E U2 | 93.282  | 10.365  | 0.000351 | 10 | 41.152    |
| 0.3174565E U2  | 0.6135349E U1  | 0.3233310E U2 | 10.944  | 1.044   | 0.072414 |    |           |

## FIXED HUP FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1309 T 405 CTR 405 FLT 500.0 TR 1 = 1 P.M. FLAP = 18

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.4027182E U5  |                |               |         |         |          | 1  | 4.115     |
| 0.1686194E U4  | 0.1674452E C5  | 0.1342525E U5 | 81.121  | 81.121  | 1.000000 | 2  | 8.230     |
| 0.1127667E U4  | -0.6452453E C4 | 0.6550250E U4 | 279.913 | 139.957 | 0.549552 | 3  | 12.346    |
| -0.8014592E U4 | 0.1565524E C4  | 0.8257332E U4 | 166.249 | 55.410  | 0.755803 | 4  | 16.461    |
| -0.3494224E U4 | 0.1611074E C4  | 0.3333435E U4 | 152.589 | 38.147  | 0.360083 | 5  | 20.576    |
| 0.1045537E U4  | 0.3255575E C4  | 0.3144667E U4 | 72.189  | 14.438  | 0.312488 | 6  | 24.691    |
| 0.9274331E U3  | -0.1545165E U3 | 0.4481010E U3 | 348.161 | 58.027  | 0.080781 | 7  | 28.807    |
| 0.1745445E U3  | -0.1031300E C4 | 0.1035541E U4 | 274.498 | 34.424  | 0.095704 | 8  | 32.922    |
| 0.1904477E U4  | -0.1820070E U4 | 0.2033340E U4 | 316.376 | 34.547  | 0.241468 | 9  | 37.037    |
| 0.1644407E U2  | -0.6534822E U3 | 0.6542424E U3 | 271.616 | 30.180  | 0.059884 | 10 | 41.152    |
| -0.8015154E U2 | -0.2367857E C3 | 0.2309421E U3 | 250.674 | 25.068  | 0.022467 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 35 V= 122.5 KTS n= 1.55 g

FIXED HUB CHORD AT STA 18  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1003 T 405 CTR 405 FLT 500.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| U.3519471F U5  |                |               |         |        |          | 1  | 4.115     |
| U.1040134F U6  | U.4000971E C5  | 0.1120031E 06 | 20.930  | 20.930 | 1.000000 | 1  | 4.115     |
| U.1440143F U5  | 0.8151044E 04  | 0.1057261E 05 | 29.624  | 14.812 | 0.147965 | 2  | 8.230     |
| -0.1102044F U5 | -0.816200CE C4 | 0.1434018E 05 | 218.275 | 72.758 | 0.125427 | 3  | 12.346    |
| 0.3271404E U3  | U.2400000E C4  | 0.2493302E 04 | 82.451  | 20.613 | 0.022235 | 4  | 16.461    |
| -0.1400113F U4 | 0.5740045E C4  | 0.6042411E 04 | 109.083 | 21.817 | 0.054310 | 5  | 20.576    |
| 0.4649445E U3  | U.2030041E C4  | 0.2033121E 04 | 76.966  | 12.828 | 0.018604 | 6  | 24.691    |
| 0.5906504E U3  | -0.1504049E C4 | 0.1010060E 04 | 291.429 | 41.633 | 0.014434 | 7  | 28.807    |
| 0.5041574E U2  | U.4506304E C2  | 0.6000042E 02 | 42.153  | 5.269  | 0.000607 | 8  | 32.922    |
| -0.4011504E U4 | -0.2511330E C4 | 0.5429231E 04 | 207.576 | 23.064 | 0.044474 | 9  | 37.037    |
| -0.1069736E U4 | 0.155175CF C4  | 0.1917811E 04 | 123.903 | 12.390 | 0.017123 | 10 | 41.152    |

BLADE FLAP AT STA 150.5  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1003 T 405 CTR 405 FLT 500.0 TR 15

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| U.1401574E U5  |                |               |         |         |          | 1  | 4.115     |
| U.5163709E U4  | -0.3840824E C4 | 0.0439130E 04 | 323.315 | 323.315 | 1.000000 | 1  | 4.115     |
| -U.1414240E U4 | U.2312740E C4  | 0.2713913E 04 | 121.446 | 60.723  | 0.421004 | 2  | 8.230     |
| 0.2323540E C4  | U.5637374E C3  | 0.2393355E 04 | 13.638  | 4.546   | 0.371315 | 3  | 12.346    |
| U.1415162E U4  | -U.1241240E C4 | 0.1882394E 04 | 318.745 | 79.086  | 0.292336 | 4  | 16.461    |
| -U.2275713F U3 | -0.183302CE C4 | 0.1847637E 04 | 202.925 | 52.585  | 0.286946 | 5  | 20.576    |
| -U.3402117E U3 | -U.7707207E C3 | 0.8497337E U3 | 240.400 | 41.067  | 0.131473 | 6  | 24.691    |
| U.7633250E U2  | -U.7029000E C2 | 0.7070325E U3 | 276.198 | 39.457  | 0.109811 | 7  | 28.807    |
| U.1000670E U4  | -U.3855550E C2 | 0.1006001E C2 | 337.805 | 44.726  | 0.150557 | 8  | 32.922    |
| 0.2527329E U3  | U.2155305E C3  | 0.3347888E U3 | 43.979  | 4.553   | 0.051990 | 9  | 37.037    |
| U.2393140E C3  | -U.1160906E C3 | 0.2053854E U3 | 334.122 | 33.412  | 0.041307 | 10 | 41.152    |

BLADE FLAP AT STA 205  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1003 T 405 CTR 405 FLT 500.0 TR 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -U.5435488F U4 |                |               |         |         |          | 1  | 4.115     |
| -U.2844452E U4 | U.5306570E C4  | 0.0022844E U4 | 118.188 | 118.188 | 1.000000 | 1  | 4.115     |
| U.3081631F U4  | -0.1553871F C4 | 0.3403919E U4 | 332.651 | 160.320 | 0.576043 | 2  | 8.230     |
| -U.4277632E U3 | -U.7827940E C3 | 0.8420313E U3 | 241.345 | 80.448  | 0.148111 | 3  | 12.346    |
| 0.1002404F U4  | -0.1116917E U4 | 0.1453307E U4 | 325.124 | 81.281  | 0.324316 | 4  | 16.461    |
| U.2495260E U2  | -0.1412502E C4 | 0.1412754E U4 | 271.174 | 54.235  | 0.235573 | 5  | 20.576    |
| -U.4404444E U3 | -U.7131090E C3 | 0.3001037E U3 | 235.154 | 39.192  | 0.144269 | 6  | 24.691    |
| -U.1404092E U3 | U.0025321E C1  | 0.1466181E U3 | 177.410 | 25.344  | 0.024344 | 7  | 28.807    |
| U.7300C20E C2  | U.4460029E U3  | 0.4526030E U3 | 80.718  | 10.040  | 0.075144 | 8  | 32.922    |
| 0.6015621E U1  | -U.1434041E C3 | 0.1436101E U3 | 87.549  | 9.733   | 0.023844 | 9  | 37.037    |
| U.1320410E U3  | -U.5503444E C2 | 0.1453683E U3 | 336.040 | 33.004  | 0.024136 | 10 | 41.152    |

BLADE FLAP AT STA 235  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1003 T 405 CTR 405 FLT 500.0 TR 4

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| U.3233593E C4  |                |               |         |         |          | 1  | 4.115     |
| -U.5164600F U3 | 0.4200207E C4  | 0.4317901E U4 | 47.167  | 47.167  | 1.000000 | 1  | 4.115     |
| 0.2386715F U4  | -0.6516074E C3 | 0.2474005E U4 | 344.729 | 172.365 | 0.572700 | 2  | 8.230     |
| U.3502300E U3  | -U.1159035E U4 | 0.1251410E U4 | 286.539 | 95.513  | 0.269681 | 3  | 12.346    |
| 0.1391025E U4  | -0.1294722E C4 | 0.1403742E U4 | 316.943 | 74.236  | 0.440685 | 4  | 16.461    |
| -0.1440574E U3 | -U.1459240E C4 | 0.1535212E U4 | 264.487 | 52.897  | 0.348003 | 5  | 20.576    |
| -0.3720242E U3 | -U.9410242E U3 | 0.1011344E U4 | 240.429 | 41.405  | 0.234237 | 6  | 24.691    |
| -U.1217405E U2 | -U.7615308E C3 | 0.7610202E U3 | 269.083 | 38.440  | 0.176304 | 7  | 28.807    |
| U.1865327E U4  | -0.7736816E C3 | 0.2017560E U4 | 337.451 | 42.181  | 0.467033 | 8  | 32.922    |
| -U.2043340E U1 | -0.4514753E C2 | 0.4421455E U2 | 240.820 | 29.864  | 0.022467 | 9  | 37.037    |
| -U.1480787E U3 | U.1511132E C3  | 0.2417075E U3 | 127.769 | 12.777  | 0.055765 | 10 | 41.152    |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 35 V= 122.5 KTS n= 1.55 g

BLADE FLAP AT STA 270  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 405 FLT 500.0 TR 20

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.5335573F C4  |                |               |         |         |          | 1  | 4.115     |
| 0.1364295E U4  | 0.1474785E C4  | 0.2400224E U4 | 55.361  | 55.361  | 1.000000 | 1  | 4.115     |
| 0.1269526F U4  | -0.1484333E C3 | 0.1278571E U4 | 353.333 | 176.667 | 0.532688 | 2  | 8.230     |
| 0.5066150E U3  | -0.1342783E C4 | 0.1435174E U4 | 290.671 | 96.890  | 0.547933 | 3  | 12.346    |
| 0.1514573E U4  | -0.4044331E U3 | 0.1708463E U4 | 329.232 | 82.308  | 0.736998 | 4  | 16.461    |
| 0.2410542E U2  | -0.1204233E U4 | 0.1234473E U4 | 271.147 | 54.229  | 0.501817 | 5  | 20.576    |
| -0.2784419E U3 | -0.8450240E U3 | 0.4379334E U3 | 252.730 | 42.122  | 0.343759 | 6  | 24.691    |
| 0.8444060E U2  | -0.1030032E C4 | 0.1336436E U4 | 214.948 | 39.278  | 0.432000 | 7  | 28.807    |
| 0.1696680E U4  | -0.1051738F U4 | 0.1946220E U4 | 328.206 | 41.026  | 0.831080 | 8  | 32.922    |
| 0.1063522E U3  | -0.3230505E C3 | 0.3413191E U3 | 286.516 | 32.057  | 0.142203 | 9  | 37.037    |
| -0.2132654E U3 | 0.2775107E C3  | 0.3500039E U3 | 127.545 | 12.754  | 0.145821 | 10 | 41.152    |

BLADE CHORD AT STA 103  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 405 FLT 500.0 TR 17

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1984536E U6  |                |               |         |        |          | 1  | 4.115     |
| 0.4079371E U5  | 0.2207884E C5  | 0.5174097E U5 | 25.260  | 25.260 | 1.000000 | 1  | 4.115     |
| 0.4418504E U4  | 0.3372681E C4  | 0.1030422E U5 | 19.702  | 9.851  | 0.193352 | 2  | 8.230     |
| -0.1510600E U5 | -0.4722426E C4 | 0.1508614E U5 | 197.294 | 65.764 | 0.307032 | 3  | 12.346    |
| 0.7343501E U4  | -0.1443302E C4 | 0.4168852E U4 | 339.146 | 84.787 | 0.083533 | 4  | 16.461    |
| 0.2849788E U4  | 0.1933889F C4  | 0.3443935E U4 | 34.101  | 6.832  | 0.066502 | 5  | 20.576    |
| 0.1162532F U4  | -0.1524957E C3 | 0.1178301E U4 | 350.598 | 58.433 | 0.022774 | 6  | 24.691    |
| -0.1008744E U4 | 0.1044343E C4  | 0.1929103E U4 | 121.528 | 17.361 | 0.037284 | 7  | 28.807    |
| 0.2368750F U3  | -0.2021866E U3 | 0.3130013E U3 | 317.615 | 39.952 | 0.006061 | 8  | 32.922    |
| 0.1078624E U4  | 0.1751526E C4  | 0.2057000E U4 | 50.374  | 6.488  | 0.039756 | 9  | 37.037    |
| 0.2476152F U3  | 0.2561831E C3  | 0.4128521E U3 | 45.841  | 4.584  | 0.007479 | 10 | 41.152    |

BLADE CHORD AT STA 235  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 405 FLT 500.0 TR 22

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2702192E C5 |                |               |         |         |          | 1  | 4.115     |
| 0.7137883E U4  | 0.5223673E C4  | 0.7432078E U4 | 24.305  | 24.305  | 1.000000 | 1  | 4.115     |
| 0.3336477F U4  | -0.1135858E C3 | 0.3333423E U4 | 358.043 | 179.022 | 0.426250 | 2  | 8.230     |
| -0.3100411E C4 | -0.1300427E C4 | 0.3362053E U4 | 202.753 | 67.584  | 0.429267 | 3  | 12.346    |
| 0.4731543F C3  | 0.1477543E C2  | 0.4731250E U3 | 1.769   | 0.447   | 0.060447 | 4  | 16.461    |
| 0.9476213E U3  | 0.2146577E U3  | 0.1020459E U4 | 12.143  | 2.429   | 0.130292 | 5  | 20.576    |
| 0.7076501E U3  | -0.2258927E C2 | 0.7082097E U3 | 358.174 | 59.696  | 0.090424 | 6  | 24.691    |
| -0.2710942F U2 | 0.3055098E C3  | 0.3055129E U3 | 94.242  | 13.467  | 0.046796 | 7  | 28.807    |
| 0.5141655E C2  | -0.7566057E C3 | 0.3002590E U3 | 273.604 | 34.210  | 0.102177 | 8  | 32.922    |
| 0.2375166E U4  | 0.1555598E C4  | 0.2342583E U4 | 33.178  | 3.686   | 0.362941 | 9  | 37.037    |
| -0.9248204E U2 | 0.2314766E U3  | 0.2442670E U3 | 111.778 | 11.178  | 0.031426 | 10 | 41.152    |

BLADE TORSION AT STA 131.5  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 405 CTR 405 FLT 500.0 TR 44

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.1022110E U3 |                |               |         |        |          | 1  | 4.115     |
| 0.2842011E U4  | 0.3857520E C4  | 0.4631895E U4 | 52.152  | 52.152 | 1.000000 | 1  | 4.115     |
| 0.6073845E U3  | 0.4076414E U3  | 0.7315247E U3 | 33.870  | 16.935 | 0.157932 | 2  | 8.230     |
| 0.1932555F C3  | -0.1456533E C4 | 0.1456247E U4 | 277.558 | 92.519 | 0.317213 | 3  | 12.346    |
| -0.1361540E C4 | 0.7583601E C3  | 0.1578731E U4 | 149.622 | 37.406 | 0.340839 | 4  | 16.461    |
| 0.3334497E U3  | 0.1522035F U4  | 0.1533243E U4 | 77.625  | 15.525 | 0.336415 | 5  | 20.576    |
| 0.1124303E U4  | 0.5334423E C3  | 0.1244415E U4 | 25.381  | 4.230  | 0.288662 | 6  | 24.691    |
| 0.1689531E U3  | -0.1333324F C4 | 0.1341736E U4 | 277.137 | 39.591 | 0.290105 | 7  | 28.807    |
| 0.7770541E U3  | -0.1765525E C4 | 0.1323083E U4 | 293.767 | 36.721 | 0.416583 | 8  | 32.922    |
| -0.1427424E U2 | 0.1626384E C2  | 0.2163450E U2 | 131.257 | 14.582 | 0.004675 | 9  | 37.037    |
| 0.1335241E C3  | 0.2222015E U2  | 0.1353603E U3 | 9.448   | 0.945  | 0.029224 | 10 | 41.152    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 36 V= 173 KTS n= .99 g

BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 365 CTR 174 FLT 438.0 TR 31

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.9294243F 01  |                |               |         |         |          |    |           |
| 0.397346F 01   | -0.3774081E 01 | 0.5480178F 01 | 316.474 | 316.474 | 1.000000 | 1  | 4.132     |
| -0.1972506F 00 | -0.2396311E 00 | 0.3064443E 00 | 231.143 | 115.571 | 0.055919 | 2  | 8.264     |
| -0.8711906E-02 | -0.7443192E-01 | 0.7444456E-01 | 263.307 | 87.769  | 0.013676 | 3  | 12.397    |
| -0.5507685F-01 | -0.8820236F-01 | 0.1039661F 00 | 238.018 | 59.504  | 0.018975 | 4  | 16.529    |
| 0.5140465F-01  | -0.1117436E-01 | 0.5314642E-01 | 347.863 | 69.573  | 0.009698 | 5  | 20.661    |
| -0.0773082E-02 | 0.3141808F-01  | 0.3274467F-01 | 106.361 | 17.727  | 0.005975 | 6  | 24.793    |
| -0.1719658E-01 | 0.3127963E-01  | 0.3579184F-01 | 119.081 | 17.012  | 0.006531 | 7  | 28.926    |
| -0.2644460E-02 | 0.2046040F-01  | 0.2013720F-01 | 97.505  | 17.188  | 0.001766 | 8  | 33.058    |
| -0.2059677E-01 | -0.9408692F-02 | 0.2224708E-01 | 207.209 | 22.468  | 0.004060 | 9  | 37.190    |
| -0.1930257E-02 | 0.6144973F-01  | 0.2073404E-02 | 162.760 | 16.276  | 0.000378 | 10 | 41.322    |

SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-56A SHIP 1005 T 365 CTR 174 FLT 438.0 TR 36

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.7421172F 04 |                |               |         |        |          |    |           |
| -0.2164018F 04 | 0.8852106F 05  | 0.8894750F 05 | 91.400  | 91.400 | 1.000000 | 1  | 4.132     |
| -0.2451401E 04 | -0.1843537E 03 | 0.2458522E 04 | 184.300 | 92.150 | 0.027765 | 2  | 8.264     |
| 0.4771742F 04  | -0.1810289E 05 | 0.1872702E 05 | 284.762 | 94.921 | 0.211491 | 3  | 12.397    |
| -0.1067959F 04 | 0.1200041E 04  | 0.1603712F 04 | 131.558 | 32.889 | 0.018111 | 4  | 16.529    |
| 0.6321852E 04  | 0.8212539E 04  | 0.1044338F 05 | 52.746  | 10.549 | 0.117941 | 5  | 20.661    |
| 0.5417055F 03  | -0.3110894E 00 | 0.5816055F 03 | 359.969 | 59.995 | 0.006568 | 6  | 24.793    |
| -0.2584708F 04 | -0.2337377E 04 | 0.3494431F 04 | 272.173 | 31.732 | 0.039356 | 7  | 28.926    |
| -0.7499817E 03 | 0.7842461E 03  | 0.1085133E 04 | 133.721 | 16.715 | 0.012255 | 8  | 33.058    |
| -0.1691823F 04 | 0.1049292F 04  | 0.1992306F 04 | 148.040 | 16.449 | 0.022387 | 9  | 37.190    |
| 0.7405073F 02  | -0.3585059E 03 | 0.4051359E 03 | 280.533 | 28.053 | 0.004578 | 10 | 41.322    |

FIXED HUP FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 174 FLT 438.0 TR 1

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.3424487F 05 |                |               |         |         |          |    |           |
| 0.7648773F 04  | 0.2187016F 05  | 0.2316451F 04 | 70.723  | 70.723  | 1.000000 | 1  | 4.132     |
| 0.1469309F 04  | -0.1599650E 05 | 0.1605212E 05 | 275.182 | 137.591 | 0.692824 | 2  | 8.264     |
| 0.1366609F 04  | -0.4194672F 04 | 0.4411641F 04 | 298.044 | 96.015  | 0.190410 | 3  | 12.397    |
| -0.1405411F 04 | -0.0751262E 03 | 0.1645604E 04 | 211.910 | 52.977  | 0.071457 | 4  | 16.529    |
| 0.2015205F 04  | -0.2765171E 03 | 0.2034177F 04 | 352.187 | 70.437  | 0.087797 | 5  | 20.661    |
| 0.7728193F 03  | 0.3205417F 03  | 0.7908674F 03 | 23.942  | 3.990   | 0.034135 | 6  | 24.793    |
| -0.4411011E 03 | -0.1367653F 03 | 0.5001628F 03 | 195.869 | 27.981  | 0.021587 | 7  | 28.926    |
| 0.1463049F 04  | -0.5676367F 03 | 0.1569343F 04 | 338.795 | 42.349  | 0.067734 | 8  | 33.058    |
| -0.2458161F 03 | 0.1269403F 03  | 0.2766846F 03 | 152.679 | 16.964  | 0.011942 | 9  | 37.190    |
| -0.3381452E 02 | 0.1271579E 03  | 0.1315255E 03 | 104.808 | 10.481  | 0.005677 | 10 | 41.322    |

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 174 FLT 438.0 TR 3

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.5870201F 05  |                |               |         |        |          |    |           |
| 0.1034401F 04  | 0.1133429F 06  | 0.1133473F 06 | 89.492  | 89.492 | 1.000000 | 1  | 4.132     |
| 0.6226281F 04  | 0.4436195F 04  | 0.7645023F 04 | 35.470  | 17.735 | 0.067446 | 2  | 8.264     |
| -0.0793759E 04 | -0.5696969F 04 | 0.1309024F 05 | 227.798 | 75.933 | 0.115488 | 3  | 12.397    |
| -0.8392729F 03 | 0.3110411F 04  | 0.3237800F 04 | 106.126 | 26.531 | 0.028565 | 4  | 16.529    |
| 0.1051627E 04  | 0.1299487F 04  | 0.1663519F 04 | 50.901  | 10.160 | 0.014680 | 5  | 20.661    |
| 0.1660747F 04  | 0.4236810F 02  | 0.1661337E 04 | 1.461   | 0.244  | 0.014657 | 6  | 24.793    |
| 0.1104907E 04  | 0.1773163F 03  | 0.1119132F 04 | 2.116   | 1.302  | 0.009873 | 7  | 28.926    |
| 0.7520415E 03  | -0.178856E 04  | 0.1414520F 04 | 302.100 | 37.763 | 0.012486 | 8  | 33.058    |
| -0.5194001F 03 | -0.2036049F 03 | 0.5587273F 03 | 201.599 | 27.400 | 0.004929 | 9  | 37.190    |
| 0.3648887E 03  | 0.5124583E 03  | 0.6290523E 03 | 54.548  | 5.455  | 0.005550 | 10 | 41.322    |



# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 36 V= 173 KTS n= .99 g**

**BLADE FLAP AT STA 176**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 174 FLT 438.0 TR 90

| AJ             | WJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.4633572F 03  |                |               |         |         |          | 1  | 4.132     |
| 0.1170379F 04  | -0.4010550E 04 | 0.5238695F 04 | 310.043 | 310.043 | 1.000000 | 2  | 8.264     |
| -0.1914373F 04 | 0.3757578E 04  | 0.4217133E 04 | 116.998 | 58.499  | 0.804997 | 3  | 12.397    |
| 0.1469910F 04  | 0.1151212E 04  | 0.1967063F 04 | 38.068  | 17.689  | 0.356398 | 4  | 16.529    |
| -0.1224991F 03 | -0.5042603E 03 | 0.5189734E 03 | 256.324 | 64.081  | 0.099065 | 5  | 20.661    |
| -0.9235112F 02 | 0.4543267E 03  | 0.5040718E 03 | 99.365  | 19.873  | 0.096603 | 6  | 24.793    |
| -0.1248049F 03 | 0.3773997F 03  | 0.3974012F 03 | 108.299 | 18.050  | 0.075878 | 7  | 28.926    |
| -0.6513732E 03 | -0.2996665E 03 | 0.7008669E 03 | 201.660 | 28.809  | 0.133775 | 8  | 33.058    |
| 0.7925012F 03  | -0.5061028F 03 | 0.9403181E 03 | 327.437 | 40.930  | 0.179495 | 9  | 37.190    |
| -0.9059927E 02 | 0.3305640E 03  | 0.3427546F 03 | 105.327 | 11.703  | 0.065427 | 10 | 41.322    |
| -0.2094194F 03 | 0.5090250F 02  | 0.2155170E 03 | 166.338 | 16.634  | 0.041139 |    |           |

**BLADE CHORD AT STA 176**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 174 FLT 438.0 TR 42

| AJ             | WJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2830403F 05  |                |               |         |        |          | 1  | 4.132     |
| -0.2735784F 04 | 0.2666726F 05  | 0.2680717F 05 | 95.856  | 95.856 | 1.000000 | 2  | 8.264     |
| 0.3175781F 04  | 0.1640008F 04  | 0.3577799E 04 | 27.316  | 13.658 | 0.133315 | 3  | 12.397    |
| -0.3560474F 04 | -0.3448015E 04 | 0.4956387E 04 | 224.081 | 74.694 | 0.184890 | 4  | 16.529    |
| 0.2901941F 04  | -0.7026717E 03 | 0.2985816F 04 | 366.388 | 86.597 | 0.111391 | 5  | 20.661    |
| -0.1466779E 04 | -0.1136383E 03 | 0.1970056E 04 | 183.306 | 36.661 | 0.073490 | 6  | 24.793    |
| 0.5841140F 03  | -0.6304778F 03 | 0.8596211F 03 | 312.825 | 92.137 | 0.032067 | 7  | 28.926    |
| -0.2805910F 03 | 0.2909470F 03  | 0.4042061E 03 | 133.962 | 19.137 | 0.015078 | 8  | 33.058    |
| -0.9141464F 03 | -0.4611232F 02 | 0.9357849E 03 | 187.827 | 22.857 | 0.034889 | 9  | 37.190    |
| 0.5294511F 03  | -0.5549110F 03 | 0.7662102E 03 | 313.606 | 34.845 | 0.028582 | 10 | 41.322    |
| 0.6176451F 02  | 0.1452861E 03  | 0.3507668F 03 | 79.858  | 7.986  | 0.013045 |    |           |

**BLADE TORSION AT STA 131.5**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 174 FLT 438.0 TR 21

| AJ             | WJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1131732F 04  |                |               |         |        |          | 1  | 4.132     |
| 0.2272720F 04  | 0.2257344F 04  | 0.3203257E 04 | 44.808  | 44.808 | 1.000000 | 2  | 8.264     |
| -0.1694862F 04 | 0.1667349E 04  | 0.2300946E 04 | 135.550 | 67.775 | 0.743285 | 3  | 12.397    |
| -0.4688780F 03 | -0.4016217E 02 | 0.4706128F 03 | 184.920 | 61.640 | 0.146517 | 4  | 16.529    |
| -0.2298147F 03 | -0.1267439E 02 | 0.2302141E 03 | 183.157 | 45.789 | 0.071869 | 5  | 20.661    |
| 0.8711033F 03  | 0.2544929F 03  | 0.4075173E 03 | 16.286  | 3.257  | 0.283311 | 6  | 24.793    |
| 0.2317329E 03  | -0.2973848F 03 | 0.3691750F 03 | 309.881 | 51.480 | 0.115250 | 7  | 28.926    |
| -0.5122608F 03 | -0.5559903E 02 | 0.5152751F 03 | 186.194 | 26.599 | 0.160860 | 8  | 33.058    |
| 0.9160665F 03  | -0.2113040F 03 | 0.9309036E 03 | 346.481 | 43.360 | 0.290430 | 9  | 37.190    |
| -0.2008765F 03 | -0.1085517E 02 | 0.2011194E 03 | 183.094 | 20.344 | 0.062786 | 10 | 41.322    |
| -0.6127527F 02 | -0.9048245F 02 | 0.1003037E 03 | 244.437 | 24.444 | 0.031312 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 37 V= 173 KTS n= 1.24 g

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## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-56A S-I-P 1009 T 365 CTR 202 FLT 438.0 TR 31

| AJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.0455121F 01  |                |               |         |         |          | 1  | 4.132     |
| 0.0454806F 01  | -0.3949321E C1 | 0.5588892E 01 | 315.042 | 315.042 | 1.000000 | 2  | 8.264     |
| -0.2683421F 01 | -0.1935430E C0 | 0.3285561E 00 | 214.241 | 107.621 | 0.058788 | 3  | 12.397    |
| -0.0670309F 01 | -0.6086749E C1 | 0.8553226E 01 | 222.595 | 74.198  | 0.016391 | 4  | 16.529    |
| -0.6675513F 01 | -0.7122219F C1 | 0.1122454F 00 | 219.385 | 54.866  | 0.020084 | 5  | 20.661    |
| 0.3266230F 01  | -0.1145625E C1 | 0.3461285F 01 | 340.671 | 68.134  | 0.006193 | 6  | 24.793    |
| -0.1071821F 01 | 0.9646811E 02  | 0.1443503E 01 | 138.065 | 23.011  | 0.002583 | 7  | 28.926    |
| -0.1510109F 01 | 0.1037863F 01  | 0.1872372E 01 | 145.500 | 20.786  | 0.003279 | 8  | 33.058    |
| 0.0330444E 02  | -0.3892660E 02 | 0.4533153E 02 | 307.401 | 38.488  | 0.000883 | 9  | 37.190    |
| 0.2239909F 02  | 0.6711463F 02  | 0.6603017E 02 | 70.165  | 7.797   | 0.001181 | 10 | 41.322    |
| 0.2294607F 02  | -0.6695215F 02 | 0.7077500E 02 | 248.918 | 28.892  | 0.001266 |    |           |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-56A S-I-P 1009 T 365 CTR 202 FLT 438.0 TR 36

| AJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.9117395F 04 |                |               |         |         |          | 1  | 4.132     |
| -0.5781907F 05 | 0.9192163E 05  | 0.1085538F 06 | 122.170 | 122.170 | 1.000000 | 2  | 8.264     |
| -0.3057655E 04 | -0.1011727E 04 | 0.3230184F 04 | 198.253 | 99.126  | 0.029746 | 3  | 12.397    |
| -0.4790273F 04 | -0.2482621E 05 | 0.2528412E 05 | 259.079 | 86.360  | 0.232832 | 4  | 16.529    |
| -0.9443994F 03 | 0.5695706F 03  | 0.1145540E 04 | 150.197 | 37.549  | 0.010553 | 5  | 20.661    |
| 0.7207920F 04  | 0.5487219F 04  | 0.9055500E 04 | 37.281  | 7.456   | 0.083420 | 6  | 24.793    |
| -0.3152234F 03 | -0.2737032E 03 | 0.4093030E 03 | 214.818 | 35.803  | 0.003765 | 7  | 28.926    |
| -0.3603290F 04 | -0.9792378F 03 | 0.3733479E 04 | 145.204 | 27.886  | 0.034385 | 8  | 33.058    |
| 0.3524049F 03  | -0.1514777E 03 | 0.4013035E 03 | 331.420 | 41.427  | 0.003695 | 9  | 37.190    |
| -0.2706509F 03 | 0.7431465F 03  | 0.9686226E 03 | 103.170 | 11.463  | 0.008920 | 10 | 41.322    |
| 0.5143484F 03  | 0.2641638E 02  | 0.5150361E 03 | 2.440   | 0.294   | 0.004743 |    |           |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-56A S-I-P 1009 T 365 CTR 202 FLT 438.0 TR 1

| AJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2718754F 05 |                |               |         |         |          | 1  | 4.132     |
| -0.7701617E 04 | 0.2272769F 05  | 0.2399710E 05 | 108.720 | 108.720 | 1.000000 | 2  | 8.264     |
| 0.2511839F 04  | -0.1416279F 05 | 0.1833564E 05 | 277.874 | 138.937 | 0.764078 | 3  | 12.397    |
| 0.1044357F 03  | -0.5381855E 04 | 0.5382875E 04 | 271.116 | 90.372  | 0.274314 | 4  | 16.529    |
| -0.1554485F 04 | -0.1527766E 04 | 0.2183131F 04 | 224.411 | 56.103  | 0.090975 | 5  | 20.661    |
| 0.1764785F 04  | -0.3615564E 03 | 0.1801535E 04 | 348.422 | 69.684  | 0.075073 | 6  | 24.793    |
| 0.6754721F 03  | 0.3240544F 03  | 0.7493625E 03 | 25.673  | 4.270   | 0.031227 | 7  | 28.926    |
| -0.5707954F 03 | -0.6886534F 02 | 0.5749346E 03 | 186.879 | 26.697  | 0.023959 | 8  | 33.058    |
| 0.0100034F 03  | -0.7924048F 03 | 0.1260782E 04 | 321.042 | 40.130  | 0.052518 | 9  | 37.190    |
| -0.1809039F 03 | 0.6290577E 02  | 0.1514561F 03 | 160.854 | 17.873  | 0.007980 | 10 | 41.322    |
| -0.7104671E 02 | 0.1675874F 03  | 0.1620252F 03 | 112.974 | 11.297  | 0.007585 |    |           |

## FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AM-56A S-I-P 1009 T 365 CTR 202 FLT 438.0 TR 3

| AJ             | RJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.5310491F 05  |                |               |         |        |          | 1  | 4.132     |
| 0.1147713F 05  | 0.1075498F 06  | 0.1082036F 06 | 83.698  | 83.698 | 1.000000 | 2  | 8.264     |
| 0.4844425F 04  | 0.5847536E 02  | 0.4854577F 04 | 0.490   | 0.345  | 0.044869 | 3  | 12.397    |
| -0.1244754F 04 | -0.1342165F 05 | 0.1838732F 05 | 276.881 | 75.627 | 0.169933 | 4  | 16.529    |
| -0.1527373F 04 | 0.1840786E 04  | 0.2427515F 04 | 128.991 | 32.248 | 0.022435 | 5  | 20.661    |
| 0.5680715F 03  | 0.1367844E 04  | 0.1481115F 04 | 67.447  | 13.489 | 0.013688 | 6  | 24.793    |
| -0.9134902F 03 | -0.1639036F 04 | 0.1876407F 04 | 299.132 | 49.855 | 0.017341 | 7  | 28.926    |
| -0.3341734F 03 | -0.8905000E 03 | 0.9511375E 03 | 249.431 | 35.633 | 0.008790 | 8  | 33.058    |
| -0.0847451F 03 | -0.8339348E 03 | 0.1215621F 04 | 223.307 | 27.913 | 0.011236 | 9  | 37.190    |
| -0.2009783F 03 | -0.2910656E 03 | 0.3215556E 03 | 231.323 | 25.703 | 0.002572 | 10 | 41.322    |
| 0.2077449F 03  | 0.4433550E 03  | 0.4896113E 03 | 64.873  | 6.489  | 0.004525 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 37 V= 173 KTS n= 1.24 g

BLADE PLAP AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 202 FLT 438.0 TR 50

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1441809F 04  |                |               |         |         |          | 1  | 4.132     |
| 0.3647515F 04  | -0.4919086F 04 | 0.6124109E 04 | 306.560 | 306.560 | 1.000000 | 2  | 8.264     |
| -0.1578112F 04 | 0.4419754F 04  | 0.4692148E 04 | 109.656 | 54.828  | 0.766180 | 3  | 12.397    |
| 0.1358513F 04  | 0.1113549E 04  | 0.216457PF 04 | 30.928  | 10.309  | 0.353779 | 4  | 16.529    |
| -0.1508967F 03 | -0.3038128E 03 | 0.475127CF 03 | 217.862 | 54.466  | 0.080946 | 5  | 20.661    |
| -0.5345740F 02 | 0.5357404F 03  | 0.5384509E 03 | 95.698  | 19.140  | 0.087523 | 6  | 24.793    |
| -0.1757442F 03 | 0.4529880F 03  | 0.485885CE 03 | 111.205 | 18.534  | 0.079340 | 7  | 28.926    |
| -0.4903444F 03 | 0.1978071E 03  | 0.1009031F 04 | 168.984 | 24.141  | 0.144765 | 8  | 33.058    |
| 0.1639984F 03  | -0.9368957F 03 | 0.8522314E 03 | 280.885 | 35.111  | 0.139160 | 9  | 37.190    |
| -0.3375052E 02 | 0.1490711E 03  | 0.1734904F 03 | 120.768 | 13.419  | 0.028329 | 10 | 41.322    |
| -0.3055132E 03 | 0.4761157E 02  | 0.3092007E 03 | 171.142 | 17.114  | 0.050489 |    |           |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 202 FLT 438.0 TR 42

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2695961F 05  |                |               |         |         |          | 1  | 4.132     |
| 0.8015462F 03  | 0.2674196F 05  | 0.2630414E 05 | 88.254  | 88.254  | 1.000000 | 2  | 8.264     |
| 0.3170221E 04  | -0.1843962F 03 | 0.3175608E 04 | 356.662 | 178.331 | 0.120726 | 3  | 12.397    |
| -0.5453371F 04 | -0.3007579E 04 | 0.6242149F 04 | 208.825 | 69.608  | 0.237306 | 4  | 16.529    |
| 0.3142494F 04  | -0.4704258F 03 | 0.317750CF 04 | 351.486 | 87.872  | 0.120798 | 5  | 20.661    |
| -0.1613840E 04 | -0.3761282F 03 | 0.1673707E 04 | 192.987 | 38.597  | 0.063629 | 6  | 24.793    |
| 0.4942335F 03  | -0.2493353F 02 | 0.4548665F 03 | 357.112 | 55.519  | 0.018813 | 7  | 28.926    |
| -0.6474773E 03 | 0.3393374F 03  | 0.775645CE 03 | 154.056 | 22.008  | 0.029488 | 8  | 33.058    |
| 0.1754681F 03  | -0.3222698F 03 | 0.3769263E 03 | 301.241 | 37.655  | 0.014330 | 9  | 37.190    |
| 0.1347414E 03  | -0.3064019E 03 | 0.3344785E 03 | 293.644 | 32.627  | 0.012716 | 10 | 41.322    |
| -0.1114065F 03 | 0.2465935E 03  | 0.271656PE 03 | 114.824 | 11.482  | 0.010329 |    |           |

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 202 FLT 438.0 TR 21

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.9766904F 03  |                |               |         |        |          | 1  | 4.132     |
| 0.2539431E 04  | 0.2331737F 04  | 0.342024PE 04 | 43.176  | 43.176 | 1.000000 | 2  | 8.264     |
| -0.2041009F 04 | 0.1712078F 04  | 0.2664075E 04 | 140.010 | 70.005 | 0.765352 | 3  | 12.397    |
| -0.3256355F 03 | 0.1137515F 01  | 0.3256375E 03 | 179.800 | 59.933 | 0.093551 | 4  | 16.529    |
| -0.1634167F 03 | -0.2232451F 03 | 0.2766642F 03 | 233.796 | 58.449 | 0.079482 | 5  | 20.661    |
| 0.7125923F 03  | 0.3777463E 03  | 0.8065146F 03 | 27.928  | 5.586  | 0.231701 | 6  | 24.793    |
| 0.3780460F 03  | -0.3388296F 03 | 0.4716145F 03 | 314.073 | 52.346 | 0.135488 | 7  | 28.926    |
| -0.1906800F 03 | -0.3666741E 02 | 0.6816421F 03 | 183.067 | 26.152 | 0.195826 | 8  | 33.058    |
| 0.7856839F 03  | -0.3539651E 03 | 0.8617368E 03 | 335.748 | 41.968 | 0.247565 | 9  | 37.190    |
| -0.1585949F 03 | -0.3900266E 02 | 0.1633204E 03 | 193.316 | 21.535 | 0.046920 | 10 | 41.322    |
| 0.2787195F 02  | -0.6825304F 02 | 0.7045633F 02 | 293.129 | 29.313 | 0.020385 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 38 V= 172 KTS n= 1.56 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 217 FLT 438.0 TR 31

| AJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.9767344F 01  |                |               |         |         |          | 1  | 4.167     |
| 0.4375135F 01  | -0.4613918F 01 | 0.4358462F 01 | 313.478 | 313.478 | 1.000000 | 1  | 4.167     |
| -0.3154481F 00 | -0.3200558F 00 | 0.4493808F 00 | 275.415 | 112.708 | 0.070674 | 2  | 8.333     |
| -0.1028104F 00 | 0.7828691F 02  | 0.1028492F 00 | 178.424 | 59.475  | 0.016175 | 3  | 12.500    |
| -0.4016951F 01 | -0.9207165F 01 | 0.1004526F 00 | 246.429 | 61.607  | 0.015798 | 4  | 16.667    |
| 0.5031944F 02  | -0.7165974F 01 | 0.7189423F 01 | 274.625 | 54.926  | 0.011307 | 5  | 20.833    |
| 0.2905999F 01  | 0.1634614F 01  | 0.3319230F 01 | 28.910  | 4.818   | 0.005220 | 6  | 25.000    |
| 0.3615257F 01  | -0.7091256F 01 | 0.4172534F 01 | 330.048 | 47.150  | 0.006562 | 7  | 29.167    |
| -0.1316186F 01 | 0.1767874F 02  | 0.1328005F 01 | 172.350 | 21.544  | 0.002089 | 8  | 33.333    |
| 0.9792542F 02  | -0.7615313F 02 | 0.1240515F 01 | 322.129 | 35.792  | 0.001951 | 9  | 37.500    |
| -0.7396020F 02 | -0.8257069F 02 | 0.1108514F 01 | 228.149 | 22.815  | 0.001743 | 10 | 41.667    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 217 FLT 438.0 TR 32

| AJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| -0.1028643F 05 |                |               |         |         |           | 1  | 4.167     |
| -0.7951788F 05 | 0.9225025F 05  | 0.1217516F 06 | 130.761 | 130.761 | 1.000000  | 1  | 4.167     |
| -0.2544276F 04 | -0.2475813F 04 | 0.3550069F 04 | 224.219 | 112.109 | 0.029149  | 2  | 8.333     |
| -0.1357070F 05 | -0.3714321F 05 | 0.3954468F 05 | 249.930 | 83.310  | 0.0324691 | 3  | 12.500    |
| 0.4300006F 03  | 0.1399280F 04  | 0.1457258F 04 | 72.430  | 18.108  | 0.011965  | 4  | 16.667    |
| 0.3040430F 04  | 0.6042957F 04  | 0.6782801F 04 | 62.989  | 12.598  | 0.0055692 | 5  | 20.833    |
| -0.2535156F 02 | -0.2728462F 03 | 0.2740212F 03 | 264.691 | 44.115  | 0.002250  | 6  | 25.000    |
| -0.4210816F 04 | -0.1750532F 04 | 0.4563180F 04 | 202.574 | 28.939  | 0.0037443 | 7  | 29.167    |
| -0.7866666F 02 | -0.4640381F 03 | 0.4703288F 03 | 260.618 | 32.577  | 0.003862  | 8  | 33.333    |
| -0.5462747F 03 | 0.6684695F 03  | 0.8636755F 03 | 179.235 | 14.359  | 0.007091  | 9  | 37.500    |
| 0.3291574F 03  | -0.1371814F 03 | 0.3566367F 03 | 337.378 | 33.738  | 0.002528  | 10 | 41.667    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 217 FLT 438.0 TR 1

| AJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| -0.7163582F 04 |                |               |         |         |           | 1  | 4.167     |
| -0.1349394F 05 | 0.2198638F 05  | 0.2579703F 05 | 121.539 | 121.539 | 1.000000  | 1  | 4.167     |
| 0.1638642F 04  | -0.2183440F 05 | 0.2185580F 05 | 274.292 | 137.146 | 0.048772  | 2  | 8.333     |
| -0.7476443F 04 | -0.5752675F 04 | 0.6263023F 04 | 246.709 | 82.236  | 0.0242781 | 3  | 12.500    |
| -0.1092414F 04 | -0.1309144F 04 | 0.2301108F 04 | 214.675 | 53.669  | 0.009200  | 4  | 16.667    |
| -0.1164442F 02 | -0.1472020F 04 | 0.1572003F 04 | 269.575 | 53.915  | 0.006940  | 5  | 20.833    |
| 0.1178179F 03  | -0.5560190F 03 | 0.5977451F 03 | 281.368 | 46.895  | 0.023171  | 6  | 25.000    |
| -0.0499443F 03 | 0.2539645F 03  | 0.8866117F 03 | 163.345 | 23.335  | 0.034350  | 7  | 29.167    |
| 0.3143940F 03  | -0.4334983F 03 | 0.5355403F 03 | 305.640 | 38.205  | 0.020916  | 8  | 33.333    |
| -0.1028461F 03 | -0.1212063F 03 | 0.1594600F 03 | 229.685 | 25.521  | 0.006162  | 9  | 37.500    |
| 0.1017883F 03  | -0.1691259F 03 | 0.3459475F 03 | 330.733 | 33.073  | 0.011410  | 10 | 41.667    |

## FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 217 FLT 438.0 TR 3

| AJ             | RJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|-----------|----|-----------|
| 0.4832000F 05  |                |               |         |        |           | 1  | 4.167     |
| 0.1402000F 05  | 0.4516200F 05  | 0.9170531F 05 | 68.219  | 68.219 | 1.000000  | 1  | 4.167     |
| 0.1462676F 05  | 0.1457249F 04  | 0.1892843F 05 | 5.941   | 2.971  | 0.0206396 | 2  | 8.333     |
| -0.1399422F 05 | -0.1772369F 05 | 0.2252059F 05 | 231.905 | 77.302 | 0.0245565 | 3  | 12.500    |
| 0.5907346F 03  | 0.2078590F 04  | 0.3056231F 04 | 78.455  | 19.714 | 0.033325  | 4  | 16.667    |
| 0.1721252F 04  | -0.2250342F 03 | 0.1737230F 04 | 152.224 | 70.445 | 0.018943  | 5  | 20.833    |
| 0.5464496F 02  | -0.1568635F 04 | 0.1969393F 04 | 271.590 | 45.265 | 0.021474  | 6  | 25.000    |
| -0.1047118F 03 | 0.1045872F 04  | 0.1051100F 04 | 95.717  | 13.674 | 0.011461  | 7  | 29.167    |
| -0.3837534F 03 | 0.9703999F 03  | 0.1035753F 04 | 110.383 | 13.798 | 0.011294  | 8  | 33.333    |
| 0.5947600F 02  | 0.9174851F 03  | 0.7194100F 03 | 86.291  | 9.588  | 0.010025  | 9  | 37.500    |
| -0.1134724F 03 | -0.1407463F 03 | 0.3435747F 03 | 204.183 | 20.418 | 0.003746  | 10 | 41.667    |

# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 38 V= 172 KTS n= 1.56 g**

**BLADE FLAP AT STA 174**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 217 FLT 438.0 TR 50

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1481165E 04  |                |               |         |         |          | 1  | 4.167     |
| 0.4737965E 04  | -0.5634773F 04 | 0.7054602F 04 | 306.923 | 306.923 | 1.000000 | 2  | 8.333     |
| -0.2031771F 04 | 0.5852090E 04  | 0.6194754E 04 | 109.146 | 94.573  | 0.878116 | 3  | 12.500    |
| 0.1753050F 04  | 0.1206209F 04  | 0.2125465E 04 | 34.576  | 11.525  | 0.301288 | 4  | 16.667    |
| -0.5171735E 03 | -0.7624189E C3 | 0.5763322E 03 | 207.086 | 51.771  | 0.081696 | 5  | 20.833    |
| -0.4312766F 03 | 0.5111487F C3  | 0.7753359F C3 | 119.56C | 27.712  | 0.107905 | 6  | 25.000    |
| -0.6175627E 03 | 0.1709186F C3  | 0.6407517E 03 | 164.538 | 27.423  | 0.090827 | 7  | 29.167    |
| -0.5557703F 03 | 0.2564016F C3  | 0.6248687E 03 | 151.928 | 21.704  | 0.089285 | 8  | 33.333    |
| -0.1124374E 02 | -0.1587278F C3 | 0.1991886E 03 | 266.187 | 33.273  | 0.028232 | 9  | 37.500    |
| -0.1764470F 03 | 0.2143866E 03  | 0.27766C2E 03 | 129.456 | 14.384  | 0.039355 | 10 | 41.667    |
| -0.1944486F 03 | 0.9227737F 02  | 0.2153112E 03 | 154.637 | 15.464  | 0.030521 |    |           |

**BLADE CHORD AT STA 174**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 217 FLT 438.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.2447493F 05  |                |               |         |         |          | 1  | 4.167     |
| 0.4460120F 04  | 0.2116623F 05  | 0.21631C8F 05 | 78.100  | 78.100  | 1.000000 | 2  | 8.333     |
| 0.7712457F 04  | -0.1117391E C4 | 0.7792264E 04 | 351.792 | 175.896 | 0.360235 | 3  | 12.500    |
| -0.8415520E 04 | -0.4252467F 04 | 0.4429094F 04 | 206.810 | 68.937  | 0.435905 | 4  | 16.667    |
| 0.4187234F 04  | 0.6197134F 03  | 0.4232244F C4 | 8.419   | 2.105   | 0.195683 | 5  | 20.833    |
| -0.2596185F 04 | 0.4441345F C3  | 0.7742667F 04 | 161.140 | 32.230  | 0.126793 | 6  | 25.000    |
| 0.4085446E 03  | 0.4135557E C3  | 0.581325CE 03 | 45.349  | 7.558   | 0.026875 | 7  | 29.167    |
| -0.1153163E 03 | -0.2140448E C4 | 0.2143552E 04 | 266.916 | 38.131  | 0.099096 | 8  | 33.333    |
| 0.1610500F 04  | -0.2507144E C4 | 0.3323475F C4 | 298.987 | 37.373  | 0.153644 | 9  | 37.500    |
| 0.4767324E 03  | 0.2894958E C3  | 0.5577466E 03 | 31.268  | 3.474   | 0.025785 | 10 | 41.667    |
| -0.3441449F 03 | 0.1281016E C4  | 0.1337375E 04 | 106.693 | 10.669  | 0.061827 |    |           |

**BLADE TORSION AT STA 131.5**

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 365 CTR 217 FLT 438.0 TR 21

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.6645225F 03  |                |               |         |        |          | 1  | 4.167     |
| 0.2977094F 04  | 0.1220887F C4  | 0.4386020E 04 | 47.253  | 47.253 | 1.000000 | 2  | 8.333     |
| -0.1699107E 04 | 0.2585630E 04  | 0.3088457E 04 | 123.155 | 61.578 | 0.704159 | 3  | 12.500    |
| 0.2419874F 03  | 0.3534741F C2  | 0.2445553E 03 | 8.310   | 2.770  | 0.055752 | 4  | 16.667    |
| -0.4583633F 03 | -0.6629874E 03 | 0.8060042F 03 | 235.341 | 58.835 | 0.183767 | 5  | 20.833    |
| 0.9461740F 02  | 0.2193306F C3  | 0.2404814C 03 | 65.79C  | 13.158 | 0.054829 | 6  | 25.000    |
| -0.8466978F 02 | -0.5845859E C3 | 0.5507144F 03 | 261.739 | 43.623 | 0.134681 | 7  | 29.167    |
| -0.3704673F 03 | 0.4034447E C3  | 0.5477681F 03 | 132.557 | 18.937 | 0.124890 | 8  | 33.333    |
| 0.4774712F 03  | -0.6300569E C2 | 0.46162C1F 03 | 352.483 | 44.060 | 0.109808 | 9  | 37.500    |
| 0.1066065E 03  | -0.1239918E C3 | 0.1635128F 03 | 310.691 | 34.521 | 0.037280 | 10 | 41.667    |
| 0.4479977F 02  | -0.1409684F 03 | 0.1479155E 03 | 287.630 | 28.763 | 0.033724 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 39 V= 154 KTS n= 1.36 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 247 FLT 503.0 TR 31

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.6317047E J1  |                |               |         |         |          |    |           |
| 0.1826372E 01  | -0.2217057E 01 | 0.4424864E 01 | 329.931 | 329.931 | 1.000000 | 1  | 4.115     |
| -0.1062524E 00 | -0.1478054E 00 | 0.1820331E 00 | 234.289 | 117.144 | 0.041139 | 2  | 8.230     |
| -0.4421707E-01 | 0.6539278E-02  | 0.4469800E-01 | 171.587 | 57.194  | 0.010102 | 3  | 12.346    |
| 0.4306089E-02  | -0.2939537E-01 | 0.2570909E-01 | 278.334 | 69.583  | 0.006714 | 4  | 16.461    |
| -0.6854333E-02 | 0.3426252E-01  | 0.3442219E-01 | 101.319 | 20.264  | 0.007892 | 5  | 20.576    |
| 0.1122059E-01  | 0.6983463E-02  | 0.1321625E-01 | 31.897  | 5.316   | 0.002987 | 6  | 24.691    |
| -0.4563645E-02 | -0.1373013E-01 | 0.1459987E-01 | 250.124 | 35.732  | 0.003300 | 7  | 28.807    |
| 0.1284904E-01  | 0.4507900E-02  | 0.1541045E-01 | 326.490 | 40.811  | 0.003483 | 8  | 32.922    |
| -0.1294552E-01 | 0.49854E-02    | 0.1304036E-01 | 186.914 | 20.768  | 0.002947 | 9  | 37.037    |
| 0.5286570E-02  | 0.44632E-01    | 0.1576505E-01 | 61.968  | 6.197   | 0.004467 | 10 | 41.152    |

## SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 247 FLT 503.0 TR 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.3476044E 04 |                |               |         |         |          |    |           |
| -0.6208341E 05 | 0.1018633E 04  | 0.1192918E 06 | 121.362 | 121.362 | 1.000000 | 1  | 4.115     |
| -0.1288563E 04 | -0.2661271E 04 | 0.2956815E 04 | 244.164 | 122.082 | 0.024786 | 2  | 8.230     |
| -0.4322316E 04 | -0.9343188E 04 | 0.1029454E 05 | 245.174 | 81.725  | 0.086297 | 3  | 12.346    |
| -0.7413350E 03 | 0.9182385E 03  | 0.1192808E 04 | 129.663 | 32.416  | 0.009999 | 4  | 16.461    |
| 0.7544844E 04  | 0.2448446E 04  | 0.8120359E 04 | 21.670  | 4.334   | 0.068371 | 5  | 20.576    |
| 0.4454135E 02  | 0.1887636E 03  | 0.1539590E 03 | 76.709  | 12.785  | 0.001626 | 6  | 24.691    |
| -0.3026520E 04 | -0.2217054E 04 | 0.3753970E 04 | 216.200 | 30.886  | 0.031469 | 7  | 28.807    |
| -0.1771578E 04 | 0.8153171E 03  | 0.1550188E 04 | 155.287 | 19.411  | 0.016348 | 8  | 32.922    |
| 0.2355365E 02  | -0.1565830E 04 | 0.1566007E 04 | 270.862 | 30.046  | 0.013128 | 9  | 37.037    |
| 0.2166683E 03  | -0.8482151E 03 | 0.4142598E 03 | 283.709 | 28.371  | 0.007664 | 10 | 41.152    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 247 FLT 503.0 TR 11

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.3092354E J3 |                |               |         |         |          |    |           |
| -0.2394074E 03 | -0.1177041E 03 | 0.2671372E 03 | 206.143 | 206.143 | 0.860442 | 1  | 4.115     |
| 0.1673148E 03  | -0.2396966E 03 | 0.3104651E 03 | 309.460 | 154.730 | 1.000000 | 2  | 8.230     |
| -0.1291221E 02 | -0.3278607E 02 | 0.3523708E 02 | 248.504 | 82.835  | 0.113498 | 3  | 12.346    |
| -0.2073201E 02 | -0.8452376E 02 | 0.8702917E 02 | 256.219 | 64.055  | 0.280319 | 4  | 16.461    |
| -0.7634787E 02 | 0.9874066E 01  | 0.7698434E 02 | 172.627 | 34.525  | 0.247965 | 5  | 20.576    |
| -0.1296426E 02 | 0.3937418E 02  | 0.4145355E 02 | 108.225 | 18.037  | 0.133521 | 6  | 24.691    |
| -0.4664753E 01 | -0.2189960E 02 | 0.2243341E 02 | 257.476 | 36.782  | 0.072257 | 7  | 28.807    |
| -0.1704031E 01 | -0.3219047E 01 | 0.3642245E 01 | 242.105 | 30.263  | 0.011732 | 8  | 32.922    |
| -0.1118447E 01 | -0.4289042E 00 | 0.1147865E 01 | 200.981 | 22.331  | 0.003858 | 9  | 37.037    |
| 0.1546241E 02  | 0.1371413E 02  | 0.2382523E 02 | 35.143  | 3.514   | 0.076740 | 10 | 41.152    |

## FIXED HUB FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 247 FLT 503.0 TR 1

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1024229E 05 |                |               |         |         |          |    |           |
| -0.7310094E 04 | 0.2517956E 05  | 0.2621960E 05 | 106.189 | 106.189 | 1.000000 | 1  | 4.115     |
| 0.4725413E 04  | -0.1788004E 05 | 0.1844392E 05 | 284.404 | 142.402 | 0.705347 | 2  | 8.230     |
| 0.7564729E 03  | -0.4628747E 03 | 0.9738027E 03 | 329.930 | 109.977 | 0.035233 | 3  | 12.346    |
| -0.2142467E 04 | -0.1102014E 04 | 0.2439273E 04 | 207.220 | 51.805  | 0.091888 | 4  | 16.461    |
| 0.2359070E 02  | 0.7404350E 02  | 0.7771072E 02 | 72.328  | 14.466  | 0.002964 | 5  | 20.576    |
| 0.6525504E 03  | -0.2435518E 03 | 0.6568943E 03 | 339.544 | 56.591  | 0.026579 | 6  | 24.691    |
| -0.1508442E 03 | -0.2415376E 03 | 0.3484502E 03 | 236.790 | 33.827  | 0.013290 | 7  | 28.807    |
| 0.5016797E 03  | -0.6054009E 03 | 0.7862522E 03 | 309.647 | 38.706  | 0.029487 | 8  | 32.922    |
| -0.1652858E 03 | -0.3003252E 03 | 0.3428040E 03 | 241.174 | 26.797  | 0.013074 | 9  | 37.037    |
| 0.1649330E 03  | -0.2841054E 02 | 0.1673629E 03 | 350.226 | 35.023  | 0.006383 | 10 | 41.152    |



# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 39 V= 154 KTS n= 1.36 g**

FIXED HUR CHORD AT STA 18  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 247 FLT 903.0 TR 3

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.3897213E 05  |                |               |         |        |          |    |           |
| 0.4104672E 04  | 0.1081141E 04  | 0.1081920E 04 | 87.826  | 87.826 | 1.000000 | 1  | 4.115     |
| -0.7593824E 04 | 0.6803805E 04  | 0.1046491E 05 | 139.468 | 69.734 | 0.096725 | 2  | 8.230     |
| -0.6625266E 04 | -0.7253547E 04 | 0.9560367E 04 | 226.714 | 75.571 | 0.092062 | 3  | 12.346    |
| 0.1235699E 04  | 0.3649917E 03  | 0.1289901E 04 | 16.669  | 4.167  | 0.011922 | 4  | 16.461    |
| 0.1459135E 04  | -0.5363584E 03 | 0.1554542E 04 | 339.817 | 67.963 | 0.014369 | 5  | 20.576    |
| 0.5525022E 03  | -0.1040853E 04 | 0.1178437E 04 | 297.959 | 49.660 | 0.010892 | 6  | 24.691    |
| 0.7855233E 02  | 0.3516050E 03  | 0.3602815E 03 | 77.400  | 11.057 | 0.033330 | 7  | 28.807    |
| 0.1570871E 04  | 0.3878928E 03  | 0.1616053E 04 | 13.870  | 1.734  | 0.014955 | 8  | 32.922    |
| -0.1050763E 04 | -0.2216018E 03 | 0.1073876E 04 | 191.909 | 21.323 | 0.009926 | 9  | 37.037    |
| 0.7017241E 02  | 0.4486506E 03  | 0.4541052E 03 | 61.110  | 8.111  | 0.004197 | 10 | 41.152    |

BLADE FLAP AT STA 130.5  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 247 FLT 903.0 TR 19

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.5168145E 04  |                |               |         |         |          |    |           |
| 0.4410505E 04  | -0.3293621E 04 | 0.5504957E 04 | 323.252 | 323.252 | 1.000000 | 1  | 4.115     |
| -0.1485643E 04 | 0.4748113E 04  | 0.4675109E 04 | 107.374 | 53.687  | 0.903751 | 2  | 8.230     |
| 0.1573916E 03  | 0.2888554E 03  | 0.3498616E 03 | 55.653  | 18.551  | 0.063554 | 3  | 12.346    |
| 0.8506774E 03  | -0.1413304E 03 | 0.9020183E 03 | 350.986 | 87.746  | 0.163856 | 4  | 16.461    |
| -0.5828684E 03 | -0.6431282E 02 | 0.5665305E 03 | 186.518 | 37.304  | 0.102913 | 5  | 20.576    |
| -0.2268151E 03 | 0.3541116E 03  | 0.4205254E 03 | 122.641 | 20.440  | 0.076340 | 6  | 24.691    |
| -0.7875673E 01 | -0.2049620E 03 | 0.2051056E 03 | 267.855 | 38.265  | 0.037258 | 7  | 28.807    |
| 0.2641356E 03  | 0.9984677E 01  | 0.2643284E 03 | 2.165   | 0.271   | 0.048016 | 8  | 32.922    |
| 0.3993217E 02  | -0.1000475E 03 | 0.1077222E 03 | 291.759 | 32.418  | 0.019568 | 9  | 37.037    |
| 0.8408020E 02  | -0.1345140E 03 | 0.1586300E 03 | 302.008 | 30.201  | 0.028816 | 10 | 41.152    |

BLADE FLAP AT STA 205  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 247 FLT 903.0 TR 20

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.7266370E 04 |                |               |         |         |          |    |           |
| -0.2417264E 04 | 0.5076219E 04  | 0.5805605E 04 | 119.030 | 119.030 | 1.000000 | 1  | 4.115     |
| 0.9684573E 03  | -0.2188154E 04 | 0.2392907E 04 | 293.875 | 146.937 | 0.412172 | 2  | 8.230     |
| -0.2465250E 04 | -0.1151535E 04 | 0.2720971E 04 | 205.037 | 68.346  | 0.468680 | 3  | 12.346    |
| 0.4368784E 03  | 0.3460833E 03  | 0.5557813E 03 | 38.513  | 9.620   | 0.095732 | 4  | 16.461    |
| -0.1202452E 02 | -0.2375023E 03 | 0.2378065E 03 | 267.102 | 53.420  | 0.040961 | 5  | 20.576    |
| -0.5521017E 02 | 0.9062358E 02  | 0.1061165E 03 | 121.351 | 20.225  | 0.018278 | 6  | 24.691    |
| 0.7565424E 02  | 0.1578557E 02  | 0.1728362E 02 | 11.786  | 1.684   | 0.013312 | 7  | 28.807    |
| 0.9733154E 02  | 0.2212733E 03  | 0.2417339E 03 | 66.257  | 8.282   | 0.041638 | 8  | 32.922    |
| 0.9564420E 02  | 0.2003168E 02  | 0.9771936E 02 | 11.829  | 1.314   | 0.016832 | 9  | 37.037    |
| 0.1292028E 03  | -0.9554390E 02 | 0.1607220E 03 | 323.503 | 32.350  | 0.027684 | 10 | 41.152    |

BLADE FLAP AT STA 235  
HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 247 FLT 903.0 TR 4

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2111051E 04 |                |               |         |         |          |    |           |
| -0.6516514E 03 | 0.3051053E 04  | 0.3119906E 04 | 102.056 | 102.056 | 1.000000 | 1  | 4.115     |
| 0.1292602E 03  | 0.5535953E 02  | 0.1406160E 03 | 23.184  | 11.592  | 0.045071 | 2  | 8.230     |
| -0.2836314E 04 | -0.9132324E 03 | 0.2979710E 04 | 197.847 | 69.949  | 0.955064 | 3  | 12.346    |
| 0.4368784E 03  | -0.2843267E 03 | 0.5211924E 03 | 326.939 | 81.735  | 0.167054 | 4  | 16.461    |
| -0.3035513E 03 | -0.2123217E 03 | 0.3676032E 03 | 215.239 | 43.048  | 0.117947 | 5  | 20.576    |
| -0.2518473E 03 | 0.3525728E 03  | 0.4332805E 03 | 125.538 | 20.923  | 0.138876 | 6  | 24.691    |
| -0.2646504E 03 | -0.3370558E 03 | 0.3940166E 03 | 238.809 | 34.116  | 0.126291 | 7  | 28.807    |
| 0.2274344E 03  | -0.1794174E 03 | 0.2846841E 03 | 321.731 | 40.216  | 0.092850 | 8  | 32.922    |
| 0.1872482E 02  | -0.1309941E 03 | 0.1323277E 03 | 278.135 | 30.904  | 0.042414 | 9  | 37.037    |
| -0.1152543E 03 | 0.1129911E 03  | 0.1614304E 03 | 135.578 | 13.558  | 0.051742 | 10 | 41.152    |

# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 39 V= 154 KTS n= 1.36 g**

BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 247 FLT 503.0 TR 26

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2234015E 04  |                |               |         |        |          | 1  | 4.115     |
| 0.10721115E 04 |                |               |         |        |          | 2  | 8.230     |
| 0.9667589E 02  |                |               |         |        |          | 3  | 12.346    |
| -0.2411011E 04 | -0.8497713E 03 | 0.2156385E 04 | 199.415 | 66.472 | 1.000000 | 4  | 16.461    |
| -0.2625157E 02 | -0.2590613E 03 | 0.2403877E 03 | 266.214 | 66.053 | 0.101858 | 5  | 20.576    |
| 0.1477744E 01  | -0.3382014E 03 | 0.3342046E 03 | 270.250 | 54.050 | 0.132298 | 6  | 24.691    |
| -0.1567214E 03 | 0.1102852E 03  | 0.1916385E 03 | 144.865 | 24.144 | 0.074965 | 7  | 28.807    |
| -0.2351306E 03 | -0.3373640E 03 | 0.4112188E 03 | 235.125 | 33.589 | 0.160859 | 8  | 32.922    |
| 0.2254402E 03  | -0.3356733E 03 | 0.4046301E 03 | 303.944 | 37.993 | 0.150202 | 9  | 37.037    |
| 0.8364197E 02  | -0.3880403E 03 | 0.3569524E 03 | 282.164 | 31.352 | 0.155279 | 10 | 41.152    |
| -0.8061260E 02 | -0.1676369E 03 | 0.1659255E 03 | 244.374 | 24.437 | 0.072730 |    |           |

BLADE CHORD AT STA 103

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 247 FLT 503.0 TR 17

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2033122E 04  |                |               |         |        |          | 1  | 4.115     |
| -0.4435688E 04 | 0.5384798E 05  | 0.5403070E 05 | 94.713  | 94.713 | 1.000000 | 2  | 8.230     |
| -0.2778203E 04 | 0.2298818E 04  | 0.3605964E 04 | 140.394 | 70.197 | 0.066739 | 3  | 12.346    |
| -0.6549000E 04 | -0.3577451E 04 | 0.7806930E 04 | 207.274 | 69.091 | 0.144491 | 4  | 16.461    |
| 0.2715027E 04  | 0.7075251E 03  | 0.2605701E 04 | 14.606  | 3.652  | 0.051928 | 5  | 20.576    |
| 0.3580527E 04  | 0.1420365E 03  | 0.4226350E 03 | 19.638  | 3.928  | 0.007822 | 6  | 24.691    |
| 0.5016206E 03  | -0.7899434E 03 | 0.9357529E 03 | 302.416 | 50.403 | 0.017319 | 7  | 28.807    |
| -0.6038472E 03 | -0.4345354E 03 | 0.7439436E 03 | 215.739 | 30.820 | 0.013769 | 8  | 32.922    |
| -0.1085155E 04 | -0.1202160E 04 | 0.1619491E 04 | 227.928 | 28.491 | 0.029974 | 9  | 37.037    |
| 0.9545521E 03  | -0.1197934E 03 | 0.1002138E 04 | 353.135 | 39.237 | 0.018548 | 10 | 41.152    |
| 0.2508678E 01  | 0.2542534E 01  | 0.3565945E 01 | 45.414  | 4.541  | 0.030366 |    |           |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 247 FLT 503.0 TR 42

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1834630E 05  |                |               |         |        |          | 1  | 4.115     |
| -0.3987825E 04 | 0.2751632E 05  | 0.2780379E 05 | 98.246  | 98.246 | 1.000000 | 2  | 8.230     |
| -0.8465626E 03 | 0.9039956E 03  | 0.1273479E 04 | 134.776 | 67.388 | 0.045802 | 3  | 12.346    |
| -0.5160207E 04 | -0.1243352E 04 | 0.5207855E 04 | 193.548 | 64.516 | 0.190905 | 4  | 16.461    |
| 0.1643641E 04  | 0.2185054E 03  | 0.1656544E 04 | 6.759   | 1.690  | 0.066773 | 5  | 20.576    |
| 0.1485877E 03  | 0.7371406E 03  | 0.7519670E 03 | 78.603  | 15.721 | 0.027045 | 6  | 24.691    |
| -0.1636791E 03 | 0.5466840E 02  | 0.1887680E 03 | 163.166 | 27.194 | 0.006789 | 7  | 28.807    |
| -0.3361274E 03 | 0.3458367E 03  | 0.4564170E 03 | 135.840 | 19.408 | 0.017854 | 8  | 32.922    |
| -0.9105642E 03 | -0.9745537E 03 | 0.1233747E 04 | 226.944 | 28.368 | 0.047970 | 9  | 37.037    |
| 0.1537259E 04  | 0.2941943E 03  | 0.1565155E 04 | 10.834  | 1.204  | 0.056244 | 10 | 41.152    |
| 0.4450456E 03  | -0.1983661E 03 | 0.4872555E 03 | 335.977 | 33.598 | 0.017525 |    |           |

BLADE CHORD AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 408 CTR 247 FLT 503.0 TR 22

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.2701514E 05 |                |               |         |        |          | 1  | 4.115     |
| -0.1055180E 04 | 0.7727813E 04  | 0.7799516E 04 | 97.775  | 97.775 | 1.000000 | 2  | 8.230     |
| -0.1005868E 04 | 0.1060368E 04  | 0.1461420E 04 | 133.476 | 66.738 | 0.187437 | 3  | 12.346    |
| -0.1154477E 04 | -0.2104359E 03 | 0.1173588E 04 | 140.354 | 63.451 | 0.150469 | 4  | 16.461    |
| 0.1082035E 04  | -0.4743245E 03 | 0.1181432E 04 | 336.329 | 84.082 | 0.151475 | 5  | 20.576    |
| -0.4405610E 03 | 0.2753650E 03  | 0.5195381E 03 | 147.993 | 29.599 | 0.066612 | 6  | 24.691    |
| -0.7083259E 02 | 0.1769789E 03  | 0.1624858E 03 | 111.592 | 18.599 | 0.024679 | 7  | 28.807    |
| -0.4575074E 02 | -0.1298166E 03 | 0.1376556E 03 | 250.570 | 35.746 | 0.017649 | 8  | 32.922    |
| -0.5563176E 03 | -0.7676250E 03 | 0.9708083E 03 | 232.252 | 29.031 | 0.124470 | 9  | 37.037    |
| 0.3645303E 03  | -0.1928404E 03 | 0.4123550E 03 | 332.121 | 36.902 | 0.052874 | 10 | 41.152    |
| -0.5495563E 02 | -0.7099533E 02 | 0.8478015E 02 | 232.257 | 23.226 | 0.011511 |    |           |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 39 V= 154 KTS n= 1.36 g

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS PCOEL AH-56A S-1P 10C9 T 400 CTR 247 FLT 503.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| U.733C781E 03  |                |               |         |        |          |    |           |
| J.23230J2F 04  | 0.2518277E 04  | 0.3426048E 04 | 47.309  | 47.309 | 1.000000 | 1  | 4.115     |
| -0.1324225E 04 | 0.1070526E 04  | C.1702820E 04 | 141.047 | 70.524 | 0.497022 | 2  | 8.230     |
| -0.3211471E 03 | -0.4040618E 03 | 0.5162153E 03 | 231.512 | 77.171 | 0.150674 | 3  | 12.346    |
| -0.3194766E 03 | 0.2008486E 03  | 0.3773665E 03 | 147.843 | 36.961 | 0.110146 | 4  | 16.461    |
| 0.9C133540E 03 | 0.20884C2E 03  | C.6271795E 03 | 13.017  | 2.603  | 0.270627 | 5  | 20.576    |
| 0.2433658E 03  | -0.5746926E 03 | 0.6241060E 03 | 292.953 | 46.825 | 0.182165 | 6  | 24.691    |
| -0.3317478E 03 | -0.1041968E 03 | 0.3477261E 03 | 197.437 | 28.205 | 0.101495 | 7  | 28.807    |
| U.5581563E 03  | 0.3705243E 02  | 0.5593648E 03 | 3.798   | 0.475  | 0.163274 | 8  | 32.922    |
| J.2338294E 03  | -0.3449205E 02 | 0.2363597E 03 | 351.609 | 39.068 | 0.068989 | 9  | 37.037    |
| 0.1737525E 03  | -0.1223955E 03 | 0.2125363E 03 | 324.837 | 32.484 | 0.062035 | 10 | 41.192    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 40 V= 152.5 KTS n= 1.77 g

BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL AM-56A SHIP 1309 T 408 CTR 306 FLT 503.0 TR 31

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.6260310E 01  |                |               |         |         |          | 1  | 4.132     |
| 0.4224460E 01  | -0.1690132E 01 | 0.4829775E 01 | 339.516 | 339.516 | 1.000000 | 2  | 8.264     |
| -0.5263300E-02 | -0.1414799E 00 | 0.1415785E 00 | 267.861 | 133.931 | 0.029314 | 3  | 12.397    |
| -0.7236415E-01 | 0.3653254E-01  | 0.8106309E-01 | 153.213 | 91.071  | 0.016784 | 4  | 16.529    |
| -0.1016240E 00 | -0.4806053E-01 | 0.1124157E 00 | 205.311 | 51.328  | 0.023276 | 5  | 20.661    |
| -0.2724642E-01 | 0.5162062E-01  | 0.5854787E-01 | 117.736 | 23.547  | 0.012122 | 6  | 24.793    |
| 0.1267844E-01  | 0.1330512E-01  | 0.1837849E-01 | 46.382  | 7.730   | 0.003805 | 7  | 28.926    |
| 0.1363148E-02  | -0.2559940E-02 | 0.2509730E-02 | 298.383 | 42.626  | 0.000602 | 8  | 33.058    |
| 0.6733594E-04  | -0.2343429E-02 | 0.2344356E-02 | 271.646 | 33.956  | 0.000485 | 9  | 37.190    |
| -0.3275672E-02 | -0.3724152E-01 | 0.3738536E-01 | 264.973 | 29.441  | 0.007741 | 10 | 41.322    |
| -0.8324747E-02 | -0.1366663E-01 | 0.1600246E-01 | 238.653 | 23.865  | 0.003313 |    |           |

SHAFT MOMENT

HARMONIC ANALYSIS MODEL AM-56A SHIP 1309 T 408 CTR 306 FLT 503.0 TR 36

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.3712327E 04 |                |               |         |         |          | 1  | 4.132     |
| -0.1166750E 06 | 0.1084122E 06  | 0.1592708E 06 | 137.103 | 137.103 | 1.000000 | 2  | 8.264     |
| -0.1778490E 04 | -0.1819353E 04 | 0.2544223E 04 | 225.651 | 112.825 | 0.015974 | 3  | 12.397    |
| -0.1625140E 05 | -0.6961043E 04 | 0.1767948E 05 | 203.187 | 67.729  | 0.111003 | 4  | 16.529    |
| -0.9392534E 03 | 0.2338020E 03  | 0.9679295E 03 | 166.018 | 41.505  | 0.006077 | 5  | 20.661    |
| 0.1562211E 04  | 0.1088627E 04  | 0.2243965E 04 | 29.021  | 5.804   | 0.014089 | 6  | 24.793    |
| -0.1181050E 03 | -0.3072402E 03 | 0.3246787E 03 | 248.574 | 41.429  | 0.002039 | 7  | 28.926    |
| -0.1278265E 04 | -0.4633000E 04 | 0.4403211E 04 | 254.566 | 36.367  | 0.030158 | 8  | 33.058    |
| -0.1164560E 04 | -0.4456665E 03 | 0.1240668E 04 | 202.045 | 25.256  | 0.007790 | 9  | 37.190    |
| -0.2657837E 03 | 0.5626736E 03  | 0.6240071E 03 | 115.616 | 12.846  | 0.003918 | 10 | 41.322    |
| -0.5415063E 03 | 0.4138438E 03  | 0.6615353E 03 | 142.611 | 14.261  | 0.004279 |    |           |

PITCH LINK TENSION

HARMONIC ANALYSIS MODEL AM-56A SHIP 1309 T 408 CTR 306 FLT 503.0 TR 11

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.6115678E 03 |                |               |         |         |          | 1  | 4.132     |
| -0.1602582E 03 | -0.1679618E 03 | 0.2321509E 03 | 226.344 | 226.344 | 0.703660 | 2  | 8.264     |
| 0.2515601E 03  | -0.2134565E 03 | 0.3299185E 03 | 319.684 | 159.842 | 1.000000 | 3  | 12.397    |
| -0.1131250E 03 | 0.9149756E 01  | 0.1134945E 03 | 175.376 | 58.459  | 0.344008 | 4  | 16.529    |
| -0.4175018E 01 | -0.7798756E 02 | 0.7809923E 02 | 266.936 | 66.734  | 0.236723 | 5  | 20.661    |
| -0.5464577E 02 | -0.3474435E 02 | 0.1008629E 03 | 200.150 | 40.030  | 0.305721 | 6  | 24.793    |
| 0.2753339E 02  | 0.2062746E 02  | 0.3440318E 02 | 36.840  | 6.140   | 0.104278 | 7  | 28.926    |
| 0.6544910E 01  | 0.2933867E 02  | 0.3005983E 02 | 77.424  | 11.061  | 0.091113 | 8  | 33.058    |
| 0.6926123E 01  | 0.2988844E 02  | 0.3068085E 02 | 76.949  | 9.619   | 0.092995 | 9  | 37.190    |
| 0.4681264E 01  | -0.4815064E 01 | 0.1087429E 02 | 295.499 | 32.833  | 0.032461 | 10 | 41.322    |
| -0.4333152E 01 | -0.1684546E 00 | 0.4337252E 01 | 182.490 | 38.249  | 0.013146 |    |           |

FIXED INBD FLAP AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 1309 T 408 CTR 306 FLT 503.0 TR 1

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1418520E 05  |                |               |         |         |          | 1  | 4.132     |
| -0.2150500E 05 | 0.2452433E 05  | 0.3261760E 05 | 131.247 | 131.247 | 1.000000 | 2  | 8.264     |
| 0.6302674E 04  | -0.1988314E 05 | 0.2085798E 05 | 287.586 | 143.793 | 0.639470 | 3  | 12.397    |
| -0.1679342E 04 | 0.2108845E 04  | 0.2369310E 04 | 117.104 | 39.035  | 0.072630 | 4  | 16.529    |
| -0.2657597E 04 | -0.2431155E 04 | 0.3828894E 04 | 219.417 | 54.854  | 0.117387 | 5  | 20.661    |
| -0.2114111E 04 | -0.4790781E 03 | 0.2167713E 04 | 142.768 | 38.554  | 0.066458 | 6  | 24.793    |
| -0.3233306E 03 | -0.1188624E 04 | 0.1231816E 04 | 254.782 | 42.464  | 0.037765 | 7  | 28.926    |
| 0.2593760E 03  | -0.3596670E 03 | 0.4434368E 03 | 305.797 | 43.685  | 0.013595 | 8  | 33.058    |
| 0.8162480E 03  | 0.8417227E 03  | 0.1208896E 04 | 47.530  | 5.941   | 0.037063 | 9  | 37.190    |
| -0.2044112E 03 | 0.6210010E 02  | 0.2156360E 03 | 143.101 | 18.122  | 0.006550 | 10 | 41.322    |
| 0.3597678E 02  | 0.6921565E 02  | 0.4776283E 02 | 65.863  | 6.586   | 0.002997 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 40 V= 152.5 KTS n= 1.77 g

FIXED HUB CHORD AT STA 18

HARMONIC ANALYSIS MODEL AM-56A SHIP 100V T 408 CTR 306 FLT 503.0 TR 3

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.2665584E 05  |                |               |         |        |          |    |           |
| 0.4475093E 05  | 0.8857106E 05  | 0.9923444E 05 | 63.195  | 63.195 | 1.000000 | 1  | 4.132     |
| -0.7408859E 04 | 0.6226023E 04  | 0.1128220E 05 | 146.507 | 73.253 | 0.113693 | 2  | 8.264     |
| -0.5111172E 04 | -0.1037114E 05 | 0.1156220E 05 | 243.765 | 81.255 | 0.116514 | 3  | 12.397    |
| 0.1016036E 03  | 0.5727607E 03  | 0.5817024E 03 | 79.941  | 19.985 | 0.005862 | 4  | 16.529    |
| 0.2501046E 02  | -0.1658821E 04 | 0.1659018E 04 | 270.885 | 54.177 | 0.016718 | 5  | 20.661    |
| -0.2010630E 03 | -0.1660778E 04 | 0.1672904E 04 | 263.097 | 43.849 | 0.016858 | 6  | 24.793    |
| 0.4148223E 03  | -0.2546715E 03 | 0.4501731E 03 | 328.648 | 46.957 | 0.004940 | 7  | 28.926    |
| 0.9255140E 03  | 0.6800354E 03  | 0.1152150E 04 | 36.221  | 4.528  | 0.011611 | 8  | 33.056    |
| -0.4742551E 03 | 0.7902164E 02  | 0.4807935E 03 | 170.540 | 18.944 | 0.004845 | 9  | 37.190    |
| 0.7432361E 03  | 0.2955779E 03  | 0.7496538E 03 | 21.687  | 2.169  | 0.008060 | 10 | 41.322    |

BLADE FLAP AT STA 130.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 100V T 408 CTR 306 FLT 503.0 TR 19

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1063014E 05  |                |               |         |         |          |    |           |
| 0.5405738E 04  | -0.3580357E 04 | 0.6487223E 04 | 326.502 | 326.502 | 1.000000 | 1  | 4.132     |
| -0.1815197E 04 | 0.4584000E 04  | 0.4930713E 04 | 111.603 | 55.801  | 0.760004 | 2  | 8.264     |
| 0.1366044E 03  | -0.2653944E 00 | 0.1386096E 03 | 359.890 | 119.963 | 0.021367 | 3  | 12.397    |
| 0.1740530E 04  | 0.4794951E 03  | 0.1423705E 04 | 19.682  | 4.920   | 0.219463 | 4  | 16.529    |
| 0.1649503E 03  | -0.3758607E 02 | 0.1692125E 03 | 347.173 | 69.435  | 0.026084 | 5  | 20.661    |
| 0.2530160E 03  | 0.5932563E 03  | 0.6449575E 03 | 66.902  | 11.150  | 0.099420 | 6  | 24.793    |
| 0.2777204E 03  | 0.2718852E 03  | 0.3886548E 03 | 44.392  | 6.342   | 0.059911 | 7  | 28.926    |
| -0.2102383E 03 | 0.5926575E 01  | 0.6288425E 03 | 109.532 | 13.691  | 0.096936 | 8  | 33.058    |
| 0.1065524E 03  | -0.8881960E 02 | 0.1390246E 03 | 320.292 | 35.588  | 0.021431 | 9  | 37.190    |
| 0.4745822E 02  | -0.1554755E 01 | 0.4748365E 02 | 358.124 | 35.812  | 0.007320 | 10 | 41.322    |

BLADE FLAP AT STA 205

HARMONIC ANALYSIS MODEL AM-56A SHIP 100V T 408 CTR 306 FLT 503.0 TR 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.5803871E 04 |                |               |         |         |          |    |           |
| -0.3573853E 04 | 0.6076324E 04  | 0.7260383E 04 | 123.184 | 123.184 | 1.000000 | 1  | 4.132     |
| 0.9491470E 03  | -0.1942316E 04 | 0.2161843E 04 | 296.044 | 148.022 | 0.247759 | 2  | 8.264     |
| -0.145552E 04  | -0.8958520E 03 | 0.1885947E 04 | 208.360 | 69.453  | 0.259759 | 3  | 12.397    |
| 0.6250591E 03  | 0.6475415E 03  | 0.9000051E 03 | 46.012  | 11.503  | 0.123961 | 4  | 16.529    |
| 0.4164561E 03  | -0.7607637E 02 | 0.4274226E 03 | 347.017 | 69.403  | 0.058871 | 5  | 20.661    |
| 0.2404653E 03  | 0.5168142E 03  | 0.5701023E 03 | 65.030  | 10.838  | 0.078522 | 6  | 24.793    |
| 0.478852F 02   | 0.3684211E 03  | 0.3714944E 03 | 82.625  | 11.804  | 0.051167 | 7  | 28.926    |
| -0.1440783E 03 | 0.1088955E 03  | 0.1806016E 03 | 142.918 | 17.865  | 0.024875 | 8  | 33.058    |
| -0.2086670E 02 | 0.3146544E 02  | 0.3775565E 02 | 123.551 | 13.728  | 0.005200 | 9  | 37.190    |
| -0.3431749E 02 | 0.1456326E 02  | 0.3727972E 02 | 157.005 | 15.701  | 0.005135 | 10 | 41.322    |

BLADE FLAP AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 100V T 408 CTR 306 FLT 503.0 TR 4

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.1265625E 03  |                |               |         |         |          |    |           |
| -0.7886787E 03 | 0.4489652E 04  | 0.4558395E 04 | 99.963  | 99.963  | 1.000000 | 1  | 4.132     |
| 0.1531429E 03  | -0.8346033E 02 | 0.1744086E 03 | 331.410 | 165.705 | 0.038261 | 2  | 8.264     |
| -0.2014387E 04 | -0.9408574E 03 | 0.2223278E 04 | 205.036 | 68.345  | 0.487733 | 3  | 12.397    |
| 0.1195728E 04  | 0.6212266E 03  | 0.1367475E 04 | 27.454  | 6.863   | 0.295603 | 4  | 16.529    |
| 0.4116025E 03  | -0.4270486E 03 | 0.5931165E 03 | 313.945 | 62.789  | 0.130115 | 5  | 20.661    |
| 0.1645751E 03  | 0.7249319E 02  | 0.1799146E 03 | 23.831  | 3.972   | 0.039469 | 6  | 24.793    |
| 0.4554275E 03  | -0.9879811E 02 | 0.4680208E 03 | 347.760 | 49.680  | 0.102233 | 7  | 28.926    |
| 0.2558245E 03  | 0.7806917E 03  | 0.8215386E 03 | 71.857  | 8.982   | 0.180225 | 8  | 33.058    |
| 0.7440953E 02  | -0.5876389E 02 | 0.9481543E 02 | 321.700 | 35.744  | 0.020800 | 9  | 37.190    |
| 0.3085223E 02  | 0.8810704E 02  | 0.9335260E 02 | 70.701  | 7.070   | 0.020479 | 10 | 41.322    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 40 V= 152.5 KTS n= 1.77 g

BLADE FLAP AT STA 270

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 400 CTR 306 FLT 503.0 TR 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.4371194E 04  |                |               |         |        |          |    |           |
| 0.4612443E 03  | 0.2172476E 04  | 0.2387954E 04 | 65.473  | 65.473 | 1.000000 | 1  | 4.132     |
| -0.2070971E 03 | 0.1010116E 04  | 0.1031127E 04 | 101.586 | 50.793 | 0.431804 | 2  | 8.264     |
| -0.1612393E 04 | -0.9051621E 03 | 0.1889538E 04 | 211.425 | 70.475 | 0.791279 | 3  | 12.397    |
| 0.4957454E 03  | 0.1588124E 03  | 0.5206099E 03 | 17.761  | 4.440  | 0.218015 | 4  | 16.529    |
| 0.3640613E 03  | -0.3575848E 03 | 0.5103049E 03 | 315.514 | 63.103 | 0.213700 | 5  | 20.661    |
| 0.8156732E 02  | -0.2813381E 03 | 0.2929238E 03 | 286.168 | 47.695 | 0.122667 | 6  | 24.793    |
| 0.5455985E 03  | -0.4628555E 03 | 0.7288764E 03 | 318.512 | 45.502 | 0.305231 | 7  | 28.926    |
| 0.5390156E 03  | 0.4102764E 03  | 0.6773955E 03 | 37.277  | 4.460  | 0.283672 | 8  | 33.058    |
| 0.2212689E 03  | -0.1683834E 03 | 0.2780522E 03 | 322.729 | 35.859 | 0.116440 | 9  | 37.190    |
| 0.3685087E 02  | 0.1267748E 03  | 0.1202333E 03 | 73.775  | 7.378  | 0.059291 | 10 | 41.322    |

BLADE CHORD AT STA 183

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 400 CTR 306 FLT 503.0 TR 17

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1989224E 06  |                |               |         |        |          |    |           |
| 0.1323884E 05  | 0.4551832E 05  | 0.4740447E 05 | 73.783  | 73.783 | 1.000000 | 1  | 4.132     |
| -0.3359524E 04 | 0.2759227E 04  | 0.4347383E 04 | 140.603 | 70.302 | 0.091708 | 2  | 8.264     |
| -0.7593789E 04 | -0.6092891E 04 | 0.1605107E 05 | 217.315 | 72.438 | 0.212028 | 3  | 12.397    |
| 0.2043349E 04  | 0.1008102E 04  | 0.2824058E 04 | 20.875  | 5.219  | 0.059679 | 4  | 16.529    |
| -0.1632422E 03 | 0.1230712E 04  | 0.124491E 04  | 97.556  | 19.511 | 0.026189 | 5  | 20.661    |
| -0.4275276E 03 | -0.2779158E 03 | 0.5095185E 03 | 213.026 | 35.504 | 0.010757 | 6  | 24.793    |
| 0.4552090E 03  | -0.1454641E 04 | 0.1528495E 04 | 287.321 | 41.046 | 0.032254 | 7  | 28.926    |
| 0.1220186E 04  | -0.5465451E 02 | 0.1221405E 04 | 357.435 | 44.679 | 0.025766 | 8  | 33.058    |
| 0.6402881E 03  | -0.1505087E 03 | 0.7065059E 03 | 347.700 | 38.633 | 0.014904 | 9  | 37.190    |
| 0.9573228E 03  | -0.2255668E 03 | 0.9835381E 03 | 346.741 | 34.674 | 0.020748 | 10 | 41.322    |

BLADE CHORD AT STA 174

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 400 CTR 306 FLT 503.0 TR 42

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1853445E 06  |                |               |         |        |          |    |           |
| 0.2787174E 04  | 0.2407934E 05  | 0.2423271E 05 | 83.467  | 83.467 | 1.000000 | 1  | 4.132     |
| -0.7146523E 03 | 0.1870461E 04  | 0.2002338E 04 | 110.911 | 55.455 | 0.082629 | 2  | 8.264     |
| -0.4996535E 04 | -0.3552318E 04 | 0.6130605E 04 | 215.411 | 71.804 | 0.252984 | 3  | 12.397    |
| 0.5600745E 03  | 0.2437210E 03  | 0.9935266E 03 | 14.244  | 3.561  | 0.040876 | 4  | 16.529    |
| -0.8556501E 03 | 0.2247245E 04  | 0.2465668E 04 | 111.300 | 22.260 | 0.101750 | 5  | 20.661    |
| -0.2300471E 03 | 0.5861025E 03  | 0.6248191E 03 | 111.424 | 18.571 | 0.025950 | 6  | 24.793    |
| -0.8591895E 03 | -0.1190680E 04 | 0.1468307E 04 | 234.186 | 33.455 | 0.060592 | 7  | 28.926    |
| 0.5055466E 03  | -0.1372090E 04 | 0.1462359E 04 | 240.241 | 36.280 | 0.060348 | 8  | 33.058    |
| 0.1623371E 04  | -0.9088834E 02 | 0.1627344E 04 | 354.925 | 39.436 | 0.042347 | 9  | 37.190    |
| 0.2857624E 03  | 0.6253162E 02  | 0.5890879E 03 | 6.090   | 0.609  | 0.024310 | 10 | 41.322    |

BLADE CHORD AT STA 235

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 400 CTR 306 FLT 503.0 TR 22

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| -0.2865277E 05 |                |               |         |        |          |    |           |
| 0.2140508E 04  | 0.5804770E 04  | 0.6186848E 04 | 69.759  | 69.759 | 1.000000 | 1  | 4.132     |
| -0.4398818E 03 | 0.5032402E 03  | 0.6683411E 03 | 131.157 | 65.578 | 0.108034 | 2  | 8.264     |
| -0.1644758E 04 | -0.1040526E 04 | 0.1946259E 04 | 212.319 | 70.773 | 0.314580 | 3  | 12.397    |
| 0.9965333E 03  | 0.2823041E 02  | 0.4964326E 03 | 1.623   | 0.406  | 0.161137 | 4  | 16.529    |
| -0.1364349E 03 | 0.9765476E 03  | 0.9860322E 03 | 97.953  | 19.591 | 0.159375 | 5  | 20.661    |
| 0.2673714E 01  | 0.3574553E 03  | 0.3574653E 03 | 89.572  | 14.929 | 0.057854 | 6  | 24.793    |
| -0.5429419E 03 | -0.5072542E 03 | 0.7430000E 03 | 223.056 | 31.865 | 0.120093 | 7  | 28.926    |
| -0.8414476E 02 | -0.8089756E 03 | 0.8133420E 03 | 264.060 | 33.008 | 0.131463 | 8  | 33.058    |
| 0.1813224E 03  | -0.9651437E 02 | 0.2054089E 03 | 331.974 | 36.886 | 0.033201 | 9  | 37.190    |
| 0.4336713E 04  | 0.1070328E 02  | 0.4244371E 02 | 58.476  | 5.848  | 0.013406 | 10 | 41.322    |

# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 40 V= 152.5 KTS n= 1.77 g**

BLADE TORSION AT STA 131.5

HARMONIC ANALYSIS MODEL AM-56A SHIP 1009 T 400 CTR 306 FLT 503.0 TR 44

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.4117124E 04  |                |               |         |         |          |    |           |
| 0.1622565E 04  | 0.3846221E 04  | 0.4174617E 04 | 67.122  | 67.122  | 1.000000 | 1  | 4.132     |
| -0.1951100E 04 | 0.1849985E 04  | 0.2414204E 04 | 129.970 | 64.989  | 0.578309 | 2  | 8.264     |
| 0.9470533E 03  | -0.5926782E 03 | 0.8065049E 03 | 312.710 | 104.237 | 0.193212 | 3  | 12.397    |
| -0.7469392E 03 | -0.3676516E 03 | 0.8325178E 03 | 206.207 | 91.552  | 0.199424 | 4  | 16.529    |
| 0.5524715E 02  | 0.6050166E 02  | 0.8199020E 02 | 47.637  | 9.527   | 0.019640 | 5  | 20.661    |
| -0.3792537E 03 | -0.1117355E 04 | 0.1180014E 04 | 251.250 | 41.875  | 0.282644 | 6  | 24.793    |
| 0.2579265E 03  | -0.2197760E 03 | 0.3702183E 03 | 323.584 | 44.226  | 0.088603 | 7  | 28.926    |
| 0.2718359E 03  | 0.1087144E 04  | 0.1120435E 04 | 75.961  | 9.495   | 0.268440 | 8  | 33.058    |
| 0.1316427E 03  | 0.3880072E 02  | 0.1374336E 03 | 16.399  | 1.822   | 0.032921 | 9  | 37.190    |
| 0.4673204E 02  | 0.1952348E 03  | 0.1151445E 03 | 66.055  | 6.606   | 0.027502 | 10 | 41.322    |

# **HARMONIC COMPONENTS OF FLIGHT TEST DATA** **CASE 41 V= 168 KTS n= 1.03 g**

## **BLADE FEATHER ANGLE**

HARMONIC ANALYSIS MODEL XH-51A SHIP 1002 T 450 CTR 101 FLT 511.0 TR 20

| FJ             | FJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.282599F 01   |                |               |         |         |          |    |           |
| 0.148556E 01   | -0.119444F 01  | 0.189068E 01  | 320.819 | 320.819 | 1.000300 | 1  | 5.848     |
| -0.118145E-01  | 0.6993740F-02  | 0.135573F-01  | 148.938 | 74.469  | 0.037171 | 2  | 11.696    |
| 0.333617E-01   | 0.248205F-01   | 0.415823E-01  | 38.649  | 12.216  | 0.021993 | 3  | 17.544    |
| -0.229672E-01  | 0.4905311F-01  | 0.9081157F-01 | 117.006 | 29.252  | 0.076769 | 4  | 23.392    |
| -0.644262E-02  | 0.1276517F-01  | 0.1424530E-01 | 116.889 | 23.378  | 0.007534 | 5  | 29.240    |
| 0.6962746E-02  | 0.1965015F-02  | 0.7235803E-02 | 15.791  | 2.632   | 0.001477 | 6  | 35.088    |
| -0.7344153E-02 | 0.5485253E-02  | 0.9168508E-02 | 143.224 | 20.461  | 0.004550 | 7  | 40.936    |
| -0.2527263E-02 | 0.1194456F-01  | 0.1220855E-01 | 101.947 | 17.743  | 0.006457 | 8  | 46.784    |
| 0.2336610E-03  | -0.1662356F-01 | 0.1662566E-01 | 270.820 | 30.091  | 0.008793 | 9  | 52.632    |
| 0.3595312E-02  | 0.1710243E-02  | 0.3981356E-02 | 25.440  | 2.544   | 0.002106 | 10 | 58.480    |

## **PITCH LINK TENSION**

HARMONIC ANALYSIS MODEL XH-51A SHIP 1002 T 450 CTR 101 FLT 511.0 TR 36

| FJ             | FJ             | FJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.105506E 01   |                |               |         |         |          |    |           |
| -0.1365151F 02 | 0.6243478F 02  | 0.7092714E 02 | 118.326 | 118.326 | 1.000000 | 1  | 5.848     |
| 0.8377016F 01  | 0.6391656E 01  | 0.1047474E 02 | 17.374  | 18.688  | 0.147683 | 2  | 11.696    |
| 0.1954366F 01  | 0.7497313F 01  | 0.1137544E 02 | 41.220  | 13.743  | 0.163382 | 3  | 17.544    |
| 0.4751492E 01  | -0.1106317F 02 | 0.1771315E 02 | 285.567 | 71.392  | 0.249737 | 4  | 23.392    |
| 0.2070913F 01  | -0.6480671F 00 | 0.2079769F 01 | 347.559 | 69.512  | 0.079323 | 5  | 29.240    |
| -0.1362651E 02 | -0.1243005E 02 | 0.1844420E 02 | 222.371 | 37.062  | 0.267044 | 6  | 35.088    |
| 0.6735514E 01  | -0.2490810F 01 | 0.4175568F 01 | 329.899 | 47.133  | 0.308741 | 7  | 40.936    |
| 0.5231802E 00  | -0.4984829F 01 | 0.5911802E 01 | 275.958 | 34.495  | 0.070667 | 8  | 46.784    |
| 0.308196E 01   | 0.4264573E 01  | 0.5248879E 01 | 54.337  | 6.037   | 0.074004 | 9  | 52.632    |
| 0.1477954E 00  | 0.9056701F 00  | 0.1006001F 01 | 81.782  | 8.178   | 0.314184 | 10 | 58.480    |

## **BLADE 3 FIXED HUB FLAP AT STA 6**

HARMONIC ANALYSIS MODEL XH-51A SHIP 1002 T 450 CTR 101 FLT 511.0 TR 43

| FJ             | FJ             | FJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2872376F 05 |                |               |         |         |          |    |           |
| -0.4109061E 04 | 0.2159215E 04  | 0.4991320F 04 | 147.081 | 147.081 | 0.664940 | 1  | 5.848     |
| -0.1749154F 04 | 0.7145313F 04  | 0.7356311F 04 | 131.756 | 51.874  | 1.000000 | 2  | 11.696    |
| 0.1015547E 04  | -0.9689409F 03 | 0.1431639E 04 | 318.345 | 105.448 | 0.120815 | 3  | 17.544    |
| -0.7877715F 03 | -0.3582344E 03 | 0.8022668F 03 | 207.832 | 51.700  | 0.112038 | 4  | 23.392    |
| -0.2248541E 03 | 0.2337638F 03  | 0.3314497E 03 | 138.243 | 27.448  | 0.040600 | 5  | 29.240    |
| 0.7460645F 02  | 0.1803857E 02  | 0.7675616E 02 | 13.592  | 7.265   | 0.010474 | 6  | 35.088    |
| 0.1108321F 01  | -0.2588504E 03 | 0.2852507E 03 | 294.841 | 42.120  | 0.038778 | 7  | 40.936    |
| -0.1535384E 03 | -0.1773412F 03 | 0.2325909E 03 | 229.679 | 28.713  | 0.331623 | 8  | 46.784    |
| 0.5150237F 02  | -0.9767202E 02 | 0.1175627F 03 | 297.998 | 13.111  | 0.015030 | 9  | 52.632    |
| -0.8008870F 02 | 0.7081939E 02  | 0.1130887E 03 | 135.089 | 13.509  | 0.015373 | 10 | 58.480    |

## **FIXED HUB CHORD AT STA 6**

HARMONIC ANALYSIS MODEL XH-51A SHIP 1002 T 450 CTR 101 FLT 511.0 TR 5

| FJ             | FJ             | FJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1687977F 05  |                |               |         |        |          |    |           |
| -0.0619534F 03 | 0.1770314E 05  | 0.1771250E 05 | 92.142  | 92.142 | 1.000000 | 1  | 5.848     |
| -0.2470599E 04 | 0.4057176F 04  | 0.5453484E 04 | 117.044 | 58.522 | 0.337889 | 2  | 11.696    |
| -0.1116332E 04 | -0.9674174E 03 | 0.1477164E 04 | 220.912 | 73.637 | 0.093708 | 3  | 17.544    |
| 0.5191775F 03  | -0.2286694E 03 | 0.5663899E 03 | 336.188 | 84.047 | 0.031977 | 4  | 23.392    |
| -0.1648867F 03 | 0.4457777E 02  | 0.1710362E 03 | 164.587 | 32.917 | 0.330656 | 5  | 29.240    |
| 0.2774607F 03  | -0.1562294E 03 | 0.3140813E 03 | 330.171 | 55.028 | 0.017732 | 6  | 35.088    |
| -0.1276566E 03 | 0.6217165E 02  | 0.1375224E 03 | 153.123 | 21.875 | 0.007764 | 7  | 40.936    |
| 0.1491323F 03  | -0.1650755E 02 | 0.1490522E 03 | 353.641 | 44.205 | 0.039415 | 8  | 46.784    |
| 0.2273711F 03  | 0.4136739F 03  | 0.4664126F 03 | 11.024  | 6.781  | 0.026502 | 9  | 52.632    |
| -0.2570403F 02 | -0.1022935F 03 | 0.1065705E 03 | 251.805 | 25.380 | 0.006014 | 10 | 58.480    |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 41 V= 168 KTS n= 1.03 g

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## BLADE FLAP AT STA 115

HARMONIC ANALYSIS MODEL VM-51A SHIP 1002 T 45R CTS 101 FLT 511.0 TR 27

| UJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX  | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|-----------|----|-----------|
| -0.4331573F 01 |                |               |         |         |           | 1  | 5.848     |
| 0.1111111F 04  | -0.7302336F 03 | 0.1747971F 04 | 327.198 | 327.198 | 1.000000  | 2  | 11.696    |
| -0.3115653F 03 | 0.7302336F 03  | 0.7794846F 03 | 105.017 | 59.508  | 0.578265  | 3  | 17.544    |
| 0.1055291F 02  | 0.1055291F 03  | 0.1432275F 03 | 45.010  | 15.303  | 0.1113795 | 4  | 23.392    |
| 0.1507633F 02  | -0.3725999F 02 | 0.4050064F 02 | 294.073 | 73.270  | 0.031046  | 5  | 29.240    |
| -0.1033360F 02 | 0.3417630F 02  | 0.3584845F 02 | 107.559 | 21.514  | 0.026594  | 6  | 35.388    |
| -0.4244251F 02 | 0.1347756F 02  | 0.4420770F 02 | 16.281  | 27.715  | 0.032792  | 7  | 40.536    |
| -0.2113557F 02 | 0.4873773F 02  | 0.5409572F 02 | 113.457 | 16.204  | 0.031109  | 8  | 46.784    |
| -0.3420394F 02 | -0.7782942F 02 | 0.1161781F 02 | 222.170 | 27.763  | 0.081127  | 9  | 52.632    |
| -0.4774951F 02 | -0.2133204F 02 | 0.4958589F 02 | 208.078 | 23.120  | 0.036786  | 10 | 58.480    |
| 0.5533191F 01  | -0.1429851F 01 | 0.1546949F 01 | 202.433 | 29.243  | 0.001148  |    |           |

## BLADE FLAP AT STA 157

HARMONIC ANALYSIS MODEL VM-51A SHIP 1002 T 45R CTS 101 FLT 511.0 TR 31

| UJ             | RJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.6174920F 01 |                |               |         |         |          | 1  | 5.848     |
| 0.5760020F 03  | -0.6721201F 03 | 0.8651694F 03 | 310.596 | 310.596 | 1.000000 | 2  | 11.696    |
| 0.5542413F 02  | 0.6349770F 03  | 0.4087093F 03 | 42.153  | 41.075  | 0.461729 | 3  | 17.544    |
| 0.7085650F 03  | 0.2513174F 03  | 0.3967222F 03 | 39.308  | 13.103  | 0.448188 | 4  | 23.392    |
| -0.8516950F 02 | -0.6482471F 02 | 0.1138959F 03 | 217.915 | 54.454  | 0.126640 | 5  | 29.240    |
| -0.1311423F 03 | -0.1354351F 03 | 0.1647941F 03 | 218.654 | 43.731  | 0.190697 | 6  | 35.388    |
| 0.1647360F 03  | -0.1542900F 03 | 0.2419675F 03 | 320.380 | 53.397  | 0.273357 | 7  | 40.536    |
| 0.7458930F 01  | -0.5746849F 02 | 0.5008658F 02 | 277.379 | 39.425  | 0.065622 | 8  | 46.784    |
| 0.2759451F 03  | 0.8797367F 02  | 0.2413915F 03 | 20.383  | 2.544   | 0.272368 | 9  | 52.632    |
| 0.7470154F 02  | 0.2356415F 02  | 0.7748076F 02 | 15.792  | 1.710   | 0.087522 | 10 | 58.480    |
| 0.1470654F 02  | -0.8589813F 01 | 0.1689603F 02 | 327.859 | 32.786  | 0.019088 |    |           |

## BLADE CHORD AT STA 45

HARMONIC ANALYSIS MODEL VM-51A SHIP 1002 T 45R CTS 101 FLT 511.0 TR 29

| UJ             | RJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1008274F 04  |                |               |         |        |          | 1  | 5.848     |
| -0.6177673F 03 | 0.1254413F 04  | 0.1260088F 04 | 92.837  | 92.837 | 1.000000 | 2  | 11.696    |
| -0.1172691F 04 | 0.4784612F 03  | 0.1335229F 04 | 151.434 | 75.717 | 0.105963 | 3  | 17.544    |
| -0.7158250F 03 | -0.4200212F 02 | 0.7255816F 03 | 197.284 | 62.429 | 0.057500 | 4  | 23.392    |
| 0.1338690F 03  | 0.1422812F 03  | 0.3537441F 03 | 23.717  | 5.929  | 0.028073 | 5  | 29.240    |
| -0.1515945F 03 | 0.1615545F 03  | 0.2218156F 03 | 131.254 | 26.651 | 0.017603 | 6  | 35.388    |
| -0.1896920F 02 | -0.6003219F 02 | 0.6292802F 02 | 252.551 | 42.792 | 0.004994 | 7  | 40.536    |
| 0.7280630F 02  | 0.1214707F 02  | 0.7577064F 02 | 21.839  | 3.406  | 0.006325 | 8  | 46.784    |
| 0.4571443F 02  | -0.8768674F 02 | 0.9683765F 02 | 297.535 | 37.192 | 0.007848 | 9  | 52.632    |
| 0.7582726F 02  | -0.8914066F 02 | 0.1112290F 03 | 310.386 | 34.487 | 0.009287 | 10 | 58.480    |
| 0.9442230F 02  | -0.5544036F 02 | 0.7775934F 02 | 314.417 | 31.442 | 0.006171 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 42 V= 169 KTS n= 1.26 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 45R CTR 214 FLT 511.0 TP 20

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.305598E-01   |                |               |         |         |          | 1  | 5.917     |
| 0.1217032E-01  | -0.1392931E-01 | 0.1849408E-01 | 311.152 | 311.152 | 1.003000 | 2  | 11.834    |
| 0.2630297E-01  | 0.1084461E-01  | 0.2837523E-01 | 22.033  | 11.016  | 0.015343 | 3  | 17.751    |
| -0.1655940E-02 | 0.3716420E-01  | 0.3720170E-01 | 92.573  | 30.858  | 0.029115 | 4  | 23.669    |
| 0.2041556E-01  | 0.4212777E-01  | 0.4681352E-01 | 64.145  | 16.036  | 0.025313 | 5  | 29.586    |
| -0.1231725E-01 | -0.8583120E-02 | 0.1389689E-01 | 210.160 | 42.032  | 0.037515 | 6  | 35.503    |
| 0.2108642E-01  | 0.3096258E-02  | 0.2131257E-01 | 8.361   | 1.394   | 0.011524 | 7  | 41.420    |
| 0.5486660E-02  | -0.7287819E-02 | 0.4122244E-02 | 306.974 | 43.853  | 0.006733 | 8  | 47.337    |
| 0.1426157E-01  | 0.1352362E-01  | 0.1567468E-01 | 43.542  | 5.443   | 0.010638 | 9  | 53.254    |
| -0.1435333E-01 | 0.1868971E-01  | 0.2387313E-01 | 128.475 | 14.275  | 0.012909 | 10 | 59.172    |
| 0.7207166E-02  | 0.2751860E-02  | 0.7714666E-02 | 20.498  | 2.090   | 0.004171 |    |           |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 45R CTR 214 FLT 511.0 TP 36

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.305598E-01   |                |               |         |         |          | 1  | 5.917     |
| -0.1076495E-02 | 0.5834114E-02  | 0.5937599E-02 | 100.455 | 100.455 | 1.000000 | 2  | 11.834    |
| 0.7237649E-01  | 0.7127277E-01  | 0.1015591E-02 | 44.543  | 22.272  | 0.171173 | 3  | 17.751    |
| 0.1177167E-02  | 0.1194712E-01  | 0.1143436E-02 | 5.999   | 1.999   | 0.192733 | 4  | 23.669    |
| -0.2044970E-01 | -0.1367429E-02 | 0.1387797E-02 | 261.453 | 65.363  | 0.233084 | 5  | 29.586    |
| 0.1014209E-02  | 0.1130373E-01  | 0.1020753E-02 | 10.330  | 2.066   | 0.172058 | 6  | 35.503    |
| -0.7455102E-01 | -0.1376112E-02 | 0.1268926E-02 | 233.963 | 38.994  | 0.213890 | 7  | 41.420    |
| 0.3771675E-01  | -0.1147450E-01 | 0.3845307E-01 | 347.717 | 44.959  | 0.064017 | 8  | 47.337    |
| 0.2795957E-02  | -0.2785073E-01 | 0.2405418E-01 | 276.683 | 34.585  | 0.040546 | 9  | 53.254    |
| 0.6474497E-01  | 0.4325385E-01  | 0.7315427E-01 | 27.743  | 3.383   | 0.123309 | 10 | 59.172    |
| 0.3676109E-01  | 0.5348277E-02  | 0.3647532E-01 | 8.471   | 0.843   | 0.061483 |    |           |

## BLADE 2 FIXED HUB FLAP AT STA 6

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 45R CTR 214 FLT 511.0 TP 43

| AJ             | BJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2265700E-05 |                |               |         |         |          | 1  | 5.917     |
| -0.2955362E-04 | -0.4536671E-02 | 0.2859932E-04 | 181.911 | 181.911 | 0.377182 | 2  | 11.834    |
| -0.1114904E-04 | 0.7499977E-04  | 0.7502375E-04 | 49.454  | 49.227  | 1.000000 | 3  | 17.751    |
| 0.5274918E-02  | -0.7160145E-02 | 0.1130301E-03 | 310.266 | 105.422 | 0.015012 | 4  | 23.669    |
| -0.8464960E-03 | -0.3490774E-02 | 0.3463699E-03 | 231.927 | 53.482  | 0.123263 | 5  | 29.586    |
| 0.3818733E-03  | 0.3197656E-01  | 0.3919855E-03 | 0.489   | 0.396   | 0.059365 | 6  | 35.503    |
| -0.9974582E-02 | 0.1606019E-03  | 0.1633107E-03 | 113.047 | 14.841  | 0.026242 | 7  | 41.420    |
| -0.7217311E-02 | -0.2051432E-03 | 0.2174679E-03 | 253.617 | 35.832  | 0.320631 | 8  | 47.337    |
| -0.2033456E-03 | -0.6317970E-01 | 0.2004631E-03 | 181.836 | 22.726  | 0.026438 | 9  | 53.254    |
| -0.1171335E-02 | -0.7553730E-02 | 0.7136497E-02 | 281.551 | 29.782  | 0.010071 | 10 | 59.172    |
| 0.4790422E-02  | 0.1204674E-03  | 0.1255284E-03 | 64.437  | 6.844   | 0.317383 |    |           |

## FIXED HUB CHORD AT STA 6

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 45R CTR 214 FLT 511.0 TP 5

| AJ             | BJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1332957E-04  |                |               |         |        |          | 1  | 5.917     |
| 0.1474641E-04  | 0.1977641E-05  | 0.1883424E-05 | 85.508  | 85.508 | 1.000000 | 2  | 11.834    |
| -0.3213064E-04 | 0.4561420E-04  | 0.5581609E-04 | 125.155 | 62.575 | 0.290354 | 3  | 17.751    |
| -0.4793681E-03 | -0.9176314E-03 | 0.1797337E-04 | 243.663 | 81.223 | 0.057327 | 4  | 23.669    |
| 0.2332067E-03  | -0.9653210E-02 | 0.2579502E-03 | 339.077 | 84.506 | 0.013696 | 5  | 29.586    |
| -0.1694935E-03 | -0.1654010E-02 | 0.2008264E-03 | 185.484 | 37.117 | 0.010463 | 6  | 35.503    |
| 0.9480772E-01  | -0.1515956E-03 | 0.1510393E-03 | 272.093 | 45.492 | 0.313186 | 7  | 41.420    |
| -0.3437327E-02 | -0.9210873E-02 | 0.9842492E-02 | 261.209 | 35.601 | 0.075231 | 8  | 47.337    |
| 0.1656410E-03  | -0.1897610E-03 | 0.2513316E-03 | 311.310 | 33.715 | 0.013344 | 9  | 53.254    |
| -0.3645050E-03 | 0.1585173E-03  | 0.3978491E-03 | 156.523 | 17.391 | 0.321124 | 10 | 59.172    |
| -0.6477385E-02 | -0.4170335E-03 | 0.4220245E-03 | 261.191 | 26.119 | 0.022455 |    |           |



# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 42 V= 169 KTS n= 1.26 g

## BLADE FLAP AT STA 115

WING TIP AIRCRAFT MODEL VM-51A SHIP 1002 T 459 CTR 214 FLT 511.0 TP 27

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.4000077E 01 |                |               |         |         |          |    |           |
| 0.1178997E 04  | -0.9140033E 03 | 0.1433925E 04 | 325.323 | 325.323 | 1.333333 | 1  | 5.917     |
| -0.2000000E 01 | 0.0178997E 04  | 0.0675093E 03 | 109.453 | 94.727  | 0.605158 | 2  | 11.834    |
| 0.167744E 03   | 0.2395011E 03  | 0.2895532E 03 | 55.807  | 18.602  | 0.201987 | 3  | 17.751    |
| -0.4460149E 01 | -0.1285474E 02 | 0.1360015E 02 | 250.845 | 62.711  | 0.339493 | 4  | 23.669    |
| -0.6119516E 02 | 1.1146307E 02  | 0.6247105E 02 | 169.333 | 33.867  | 0.043579 | 5  | 29.586    |
| -0.3774164E 02 | -0.3007500E 02 | 0.4025906E 02 | 218.550 | 36.425  | 0.033665 | 6  | 35.503    |
| -0.1306342E 02 | 0.4133131E 02  | 0.4411227E 02 | 109.503 | 15.500  | 0.033772 | 7  | 41.420    |
| -0.6585973E 02 | -0.6581044E 02 | 0.0311122E 02 | 224.982 | 28.123  | 0.064453 | 8  | 47.337    |
| 0.6354814E 01  | -0.3551129E 02 | 0.3667046E 02 | 280.051 | 31.117  | 0.025441 | 9  | 53.254    |
| -0.1590006E 02 | -0.4203611E 01 | 0.1594413E 02 | 145.280 | 19.529  | 0.011122 | 10 | 59.172    |

## BLADE FLAP AT STA 157

WING TIP AIRCRAFT MODEL VM-51A SHIP 1002 T 458 CTR 214 FLT 511.0 TP 31

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.7111710E 01 |                |               |         |         |          |    |           |
| 0.6600000E 03  | -0.8302120E 03 | 0.1064068E 04 | 308.772 | 308.772 | 1.000000 | 1  | 5.917     |
| 0.7000000E 02  | 0.4565475E 03  | 0.4619705E 03 | 81.208  | 40.634  | 0.433829 | 2  | 11.834    |
| 0.5200000E 02  | 0.4000000E 03  | 0.6679731E 03 | 37.856  | 12.552  | 0.427283 | 3  | 17.751    |
| -0.5000000E 02 | 0.2493554E 02  | 0.6734509E 02 | 156.819 | 34.205  | 0.057486 | 4  | 23.669    |
| -0.1313575E 03 | -0.1637413E 03 | 0.2055267E 03 | 231.178 | 46.236  | 0.196763 | 5  | 29.586    |
| 0.1500000E 03  | -0.1165271E 03 | 0.1052043E 03 | 323.348 | 53.891  | 0.183313 | 6  | 35.503    |
| -0.3113743E 02 | -0.3754057E 02 | 0.8534009E 02 | 248.673 | 35.525  | 0.090141 | 7  | 41.420    |
| 0.1543346E 03  | 0.5826106E 02  | 0.1649650E 03 | 20.681  | 2.585   | 0.154516 | 8  | 47.337    |
| 0.6041343E 02  | 0.3483623E 02  | 0.6073511E 02 | 29.470  | 3.330   | 0.365407 | 9  | 53.254    |
| 0.2073462E 02  | 0.2122233E 02  | 0.3572069E 02 | 36.445  | 3.645   | 0.033545 | 10 | 59.172    |

## BLADE CHORD AT STA 45

WING TIP AIRCRAFT MODEL VM-51A SHIP 1002 T 459 CTR 214 FLT 511.0 TP 29

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1777777E 05  |                |               |         |        |          |    |           |
| 0.1777777E 02  | 0.1736540E 05  | 0.1736545E 05 | 69.839  | 89.339 | 1.000000 | 1  | 5.917     |
| -0.1200000E 01 | 0.4660000E 03  | 0.1342640E 04 | 159.651 | 79.926 | 0.133475 | 2  | 11.834    |
| -0.4674550E 03 | -0.3476200E 03 | 0.5743949E 03 | 216.372 | 72.124 | 0.047976 | 3  | 17.751    |
| 0.6651580E 03  | 0.2188474E 03  | 0.4960442E 03 | 26.160  | 6.545  | 0.037114 | 4  | 23.669    |
| -0.2000000E 02 | -0.6001855E 02 | 0.2257550E 03 | 205.171 | 41.034 | 0.316491 | 5  | 29.586    |
| 0.3205420E 03  | 0.3075546E 01  | 0.3255654E 03 | 0.692   | 0.115  | 0.024658 | 6  | 35.503    |
| -0.5310785E 02 | 0.0015004E 02  | 0.1121561E 03 | 120.779 | 12.254 | 0.033301 | 7  | 41.420    |
| -0.8555201E 01 | -0.3626030E 02 | 0.3735072E 02 | 250.121 | 32.315 | 0.002705 | 8  | 47.337    |
| 0.1475925E 03  | -0.8349307E 01 | 0.1428347E 03 | 350.649 | 39.679 | 0.010687 | 9  | 53.254    |
| 0.2441330E 02  | -0.7154654E 02 | 0.7559705E 02 | 288.841 | 28.984 | 0.005656 | 10 | 59.172    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 43 V= 170 KTS n= 1.49 g

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## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 458 CTR 247 FLT 511.0 TR 20

| AJ             | PJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.3135450E 01  | -0.1726064E 01 | 0.2053083E 01 | 302.998 | 302.994 | 1.000000 | 1  | 5.917     |
| 0.1116411E 01  | -0.1071944E 01 | 0.1344423E 01 | 309.461 | 154.932 | 0.006555 | 2  | 11.834    |
| 0.4617203E 02  | 0.3464011E 01  | 0.3617311E 01 | 73.260  | 24.420  | 0.017638 | 3  | 17.751    |
| 0.1041405E 01  | 0.2141454E 01  | 0.5563150E 01 | 22.640  | 5.660   | 0.027126 | 4  | 23.669    |
| 0.5134457E 01  | -0.3505455E 02 | 0.2043337E 01 | 149.890 | 37.973  | 0.009963 | 5  | 29.586    |
| -0.2012174E 01 | 0.1715531E 01  | 0.1513466E 01 | 29.284  | 4.881   | 0.017132 | 6  | 35.503    |
| 0.1034463E 01  | -0.2442707E 01 | 0.1571224E 01 | 216.832 | 45.262  | 0.017414 | 7  | 41.420    |
| 0.2634444E 01  | 0.1597006E 01  | 0.1123545E 01 | 20.832  | 2.604   | 0.005480 | 8  | 47.337    |
| 0.1050472E 01  | 0.4541216E 02  | 0.2454540E 02 | 144.095 | 16.011  | 0.004125 | 9  | 53.254    |
| -0.6352452E 02 | 0.1384740E 01  | 0.1417156E 01 | 58.849  | 5.690   | 0.007986 | 10 | 59.172    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 459 CTR 247 FLT 511.0 TR 36

| AJ             | PJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 3.7396443E 02  | 3.6401247E 02  | 0.6497099E 02 | 94.284  | 94.284  | 1.000000 | 1  | 5.917     |
| -0.5170041E 01 | 0.7885317E 01  | 0.9701317E 01 | 54.363  | 27.184  | 0.140100 | 2  | 11.834    |
| 0.5651634E 01  | -0.2511243E 01 | 0.1521124E 02 | 349.662 | 116.121 | 0.210707 | 3  | 17.751    |
| 0.1492082E 02  | -0.8004604E 01 | 0.1341004E 02 | 271.074 | 55.259  | 0.193782 | 4  | 23.669    |
| -0.1011584E 02 | 0.1404614E 01  | 0.1503004E 02 | 15.405  | 3.081   | 0.217204 | 5  | 29.586    |
| 0.1456771E 02  | -0.2511243E 01 | 0.2454540E 02 | 195.439 | 32.573  | 0.136619 | 6  | 35.503    |
| -0.2012174E 01 | -0.6106220E 00 | 0.8141456E 02 | 273.459 | 33.537  | 0.011764 | 7  | 41.420    |
| 0.4617203E 02  | 0.5294673E 01  | 0.5370369E 01 | 273.373 | 34.022  | 0.077600 | 8  | 47.337    |
| 0.1041405E 01  | -0.4594443E 01 | 0.4217464E 01 | 347.686 | 34.632  | 0.047941 | 9  | 53.254    |
| 0.4497074E 01  | -0.2272479E 01 | 0.5480424E 01 | 335.502 | 32.550  | 0.079190 | 10 | 59.172    |

## BLADE 2 FIXED HUB FLAP AT STA 6

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 458 CTR 247 FLT 511.0 TR 43

| AJ             | PJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.2027181E 04 | -0.1373207E 04 | 3.1236207E 04 | 240.244 | 240.244 | 0.156948 | 1  | 5.917     |
| -0.2115741E 03 | 0.7885317E 01  | 0.7877107E 04 | 87.802  | 43.699  | 1.200000 | 2  | 11.834    |
| 0.3537151E 03  | 0.2466417E 03  | 0.5845730E 03 | 155.044 | 91.681  | 0.074212 | 3  | 17.751    |
| -0.5255939E 03 | -0.1204614E 01 | 0.7267817E 03 | 177.277 | 47.569  | 0.099265 | 4  | 23.669    |
| 0.7825547E 03  | -0.7222818E 02 | 0.7856809E 03 | 354.727 | 70.945  | 0.099768 | 5  | 29.586    |
| -0.1204614E 01 | 0.1404614E 01  | 0.1701946E 03 | 94.067  | 15.678  | 0.021607 | 6  | 35.503    |
| 0.7333634E 03  | -0.1459435E 01 | 0.2300335E 03 | 240.715 | 35.673  | 0.026507 | 7  | 41.420    |
| -0.2160455E 03 | 0.4025217E 02  | 0.2197636E 03 | 169.446 | 21.181  | 0.027809 | 8  | 47.337    |
| -0.4025217E 02 | -0.9537382E 02 | 0.0531524E 02 | 267.679 | 29.742  | 0.012608 | 9  | 53.254    |
| 0.2300335E 03  | 0.5433957E 02  | 0.6258443E 02 | 73.538  | 7.054   | 0.007945 | 10 | 59.172    |

## FIXED HUB CHORD AT STA 6

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 458 CTR 247 FLT 511.0 TR 5

| AJ             | PJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1107244E 04  | 0.2075764E 05  | 0.2135940E 05 | 76.363  | 76.363 | 1.000000 | 1  | 5.917     |
| 0.5038941E 04  | 0.6636045E 04  | 0.7239948E 04 | 113.494 | 56.747 | 1.333944 | 2  | 11.834    |
| -0.2076257E 04 | -0.7766111E 03 | 0.2132305E 04 | 149.427 | 46.476 | 0.051011 | 3  | 17.751    |
| -0.1057079E 04 | -0.5024370E 01 | 0.1135227E 03 | 357.462 | 39.366 | 0.005315 | 4  | 23.669    |
| 0.1174114E 03  | 0.3246245E 03  | 0.7419707E 03 | 133.332 | 21.666 | 0.316311 | 5  | 29.586    |
| -0.1075566E 03 | 0.1013340E 02  | 0.7763617E 02 | 126.402 | 21.067 | 0.001764 | 6  | 35.503    |
| -0.2306489E 02 | 0.1314229E 03  | 0.1567536E 03 | 63.542  | 9.777  | 0.006871 | 7  | 41.420    |
| 0.3374139E 03  | -0.5602101E 02 | 0.3514519E 03 | 351.743 | 43.973 | 0.018327 | 8  | 47.337    |
| -0.1358131E 03 | 0.6131611E 03  | 0.6224747E 03 | 99.790  | 11.788 | 0.029140 | 9  | 53.254    |
| -0.1218233E 03 | -0.1187500E 03 | 0.1701317E 03 | 224.270 | 22.427 | 0.007065 | 10 | 59.172    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 43 V= 170 KTS n= 1.49 g

## BLADE FLAP AT STA 115

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 45R CTR 247 FLT 511.0 TR 27

| AJ            | BJ            | CJ           | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|---------------|---------------|--------------|---------|---------|----------|----|-----------|
| -0.4555447 03 |               |              |         |         |          | 1  | 5.917     |
| 0.1333091 04  | -0.4537946 03 | 0.1438349 04 | 321.445 | 321.445 | 1.000000 | 2  | 11.836    |
| -0.2536850 03 | 0.0633514 03  | 0.4998577 03 | 106.375 | 53.187  | 0.504950 | 3  | 17.751    |
| 0.2132751 03  | 0.2563013 03  | 0.3172996 03 | 49.452  | 16.494  | 0.219261 | 4  | 23.669    |
| -0.2446281 02 | -0.2452767 02 | 0.3409265 02 | 221.750 | 55.938  | 0.022162 | 5  | 29.586    |
| -0.1144639 02 | -0.1669225 02 | 0.2052678 02 | 234.409 | 46.882  | 0.013343 | 6  | 35.503    |
| -0.1249210 02 | 0.1522516 02  | 0.2303617 02 | 121.432 | 23.572  | 0.014975 | 7  | 41.420    |
| -0.4776787 01 | 0.6093806 02  | 0.6507466 02 | 93.593  | 13.370  | 0.044902 | 8  | 47.337    |
| -0.1007120 03 | -0.6760201 02 | 0.1212981 03 | 211.871 | 26.734  | 0.078649 | 9  | 53.254    |
| -0.3742650 02 | -0.1700598 02 | 0.4110924 02 | 204.436 | 22.715  | 0.126723 | 10 | 59.172    |
| 0.7653737 01  | -0.1236150 02 | 0.1471933 02 | 302.879 | 30.288  | 0.009468 |    |           |

## BLADE FLAP AT STA 157

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 45R CTR 247 FLT 511.0 TR 31

| AJ            | BJ            | CJ           | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|---------------|---------------|--------------|---------|---------|----------|----|-----------|
| -0.4555447 03 |               |              |         |         |          | 1  | 5.917     |
| 0.1333091 04  | -0.4537946 03 | 0.1155631 04 | 304.374 | 304.374 | 1.000000 | 2  | 11.836    |
| -0.2536850 03 | 0.0633514 03  | 0.4403738 03 | 89.076  | 44.037  | 0.405586 | 3  | 17.751    |
| 0.2132751 03  | 0.2563013 03  | 0.2723146 03 | 33.616  | 11.205  | 0.029369 | 4  | 23.669    |
| -0.2446281 02 | -0.2452767 02 | 0.4777448 02 | 221.750 | 55.933  | 0.041341 | 5  | 29.586    |
| -0.1144639 02 | -0.1669225 02 | 0.3336795 02 | 212.415 | 46.483  | 0.208560 | 6  | 35.503    |
| -0.1249210 02 | 0.1522516 02  | 0.1775495 02 | 113.195 | 51.699  | 0.151639 | 7  | 41.420    |
| -0.4776787 01 | -0.1169032 02 | 0.1169817 02 | 267.862 | 38.266  | 0.191228 | 8  | 47.337    |
| -0.2325341 03 | 0.4072503 02  | 0.2419857 03 | 4.689   | 1.211   | 0.204397 | 9  | 53.254    |
| 0.6383127 02  | 0.6131015 02  | 0.7041843 02 | 30.007  | 4.444   | 0.068714 | 10 | 59.172    |
| 0.6744087 02  | 0.1294467 02  | 0.6161629 02 | 12.129  | 1.213   | 0.053318 |    |           |

## BLADE CHORD AT STA 45

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 45R CTR 247 FLT 511.0 TR 29

| AJ            | BJ            | CJ           | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|---------------|---------------|--------------|---------|--------|----------|----|-----------|
| 0.1573591 04  |               |              |         |        |          | 1  | 5.917     |
| 0.1715533 04  | 0.1419937 03  | 0.1439626 03 | 32.992  | 32.992 | 1.000000 | 2  | 11.836    |
| -0.1771135 04 | 0.1417394 04  | 1.2747195 04 | 135.444 | 69.222 | 0.164368 | 3  | 17.751    |
| -0.7821447 03 | -0.1848725 03 | 0.8102139 03 | 195.644 | 65.215 | 0.056634 | 4  | 23.669    |
| 0.3962721 03  | 0.1838625 03  | 0.5516024 03 | 46.024  | 11.024 | 0.038561 | 5  | 29.586    |
| -0.1062957 03 | 0.2254447 03  | 0.2492915 03 | 115.264 | 23.353 | 0.017425 | 6  | 35.503    |
| 0.1111751 03  | 0.2251134 03  | 0.2546950 03 | 62.114  | 10.352 | 0.017903 | 7  | 41.420    |
| 0.3228174 02  | 0.1440747 03  | 0.1485750 02 | 75.865  | 10.838 | 0.013385 | 8  | 47.337    |
| -0.3275535 02 | 0.6317537 02  | 0.7164719 02 | 119.144 | 14.769 | 0.005009 | 9  | 53.254    |
| -0.5399165 01 | 0.1571532 02  | 0.2759211 02 | 106.476 | 11.609 | 0.001425 | 10 | 59.172    |
| 0.7444756 02  | 0.4245740 02  | 0.5466710 02 | 50.050  | 5.095  | 0.003221 |    |           |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 44 V= 173 KTS n= 1.69 g

## BLADE FEATHER ANGLE

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 45R CTR 250 FLT 511.0 TR 20

| SI             | EJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.3132743E 01  |                |               |         |         |          |    |           |
| 0.4420010E 03  | -0.2249010E 01 | 0.7415723E 01 | 291.669 | 291.669 | 1.000000 | 1  | 5.988     |
| 0.6477777E-03  | 0.3657155E-01  | 0.1657225E-01 | 88.904  | 44.452  | 0.015142 | 2  | 11.976    |
| 0.3143880E-01  | 0.6242051E-01  | 0.7107154E-01 | 62.575  | 20.992  | 0.029006 | 3  | 17.964    |
| 0.5287034E-01  | 0.4203647E-02  | 0.5101719E-01 | 4.546   | 1.136   | 0.021959 | 4  | 23.952    |
| -0.4673739E-01 | -0.3535640E-02 | 0.4667055E-01 | 184.326 | 36.865  | 0.019402 | 5  | 29.940    |
| -0.4052187E-02 | -0.3327012E-02 | 0.1351722E-02 | 263.038 | 43.860  | 0.001387 | 6  | 35.928    |
| -0.2637605E-01 | -0.2265756E-01 | 0.3543155E-01 | 221.890 | 31.699  | 0.014467 | 7  | 41.916    |
| 0.7240220E-01  | -0.4035078E-01 | 0.4615240E-01 | 299.038 | 37.380  | 0.014105 | 8  | 47.904    |
| 0.1524394E-01  | 0.1261717E-01  | 0.1578619E-01 | 39.616  | 4.402   | 0.008191 | 9  | 53.892    |
| 0.2749546E-01  | -0.1605757E-01 | 0.3225179E-01 | 32.8487 | 32.849  | 0.013351 | 10 | 59.880    |

## PITCH LINK TENSION

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 45R CTR 250 FLT 511.0 TR 36

| SI             | EJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| 0.5687444E 02  |                |               |         |         |          |    |           |
| -0.7452722E 00 | 0.6147017E 02  | 0.6147488E 02 | 90.695  | 90.695  | 1.000000 | 1  | 5.988     |
| -0.5618868E 01 | 0.1253515E 02  | 0.1374489E 02 | 114.223 | 57.113  | 0.223585 | 2  | 11.976    |
| 0.1767651E 02  | -0.9071174E 01 | 0.1986819E 02 | 332.834 | 110.945 | 0.323192 | 3  | 17.964    |
| -0.1625555E 02 | -0.6547920E 02 | 0.1988676E 02 | 210.367 | 52.592  | 0.307227 | 4  | 23.952    |
| 0.1075911E 02  | -0.1037654E 02 | 0.1497643E 02 | 43.857  | 8.771   | 0.243619 | 5  | 29.940    |
| -0.6117841E 01 | 0.3083258E 01  | 0.6689792E 01 | 153.329 | 25.555  | 0.111733 | 6  | 35.928    |
| 0.1533515E 01  | 0.2390710E 01  | 0.2399912E 01 | 17.117  | 8.188   | 0.046197 | 7  | 41.916    |
| -0.2408608E 01 | -0.3573615E 01 | 0.4601243E 01 | 230.956 | 28.869  | 0.374848 | 8  | 47.904    |
| 0.7523415E 03  | -0.8838513E 00 | 0.1160500E 01 | 310.303 | 34.488  | 0.018678 | 9  | 53.892    |
| 0.3473861E 01  | -0.5314110E 01 | 0.6321577E 01 | 302.793 | 30.279  | 0.102832 | 10 | 59.880    |

## BLADE 2 FIXED HUB FLAP AT STA 6

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 45R CTR 250 FLT 511.0 TR 43

| SI             | EJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1352433E 05 |                |               |         |         |          |    |           |
| 0.5478478E 03  | -0.1830052E 04 | 0.1910295E 04 | 286.666 | 286.666 | 0.231263 | 1  | 5.988     |
| 0.4540144E 03  | 0.8247617E 04  | 0.8260734E 04 | 84.835  | 43.418  | 1.000000 | 2  | 11.976    |
| -0.3524688E 03 | 0.3498065E 03  | 0.5336816E 03 | 134.413 | 44.333  | 0.363977 | 3  | 17.964    |
| -0.8086335E 03 | 0.1188493E 03  | 0.8142703E 03 | 171.723 | 42.937  | 0.098578 | 4  | 23.952    |
| -0.3104649E 03 | -0.4262840E 03 | 0.9237049E 03 | 332.521 | 86.504  | 0.111835 | 5  | 29.940    |
| -0.7072172E 02 | 0.1551316E 03  | 0.1703324E 03 | 114.384 | 19.364  | 0.323521 | 6  | 35.928    |
| -0.1374513E 03 | -0.2800600E 03 | 0.3186577E 03 | 250.274 | 35.753  | 0.078577 | 7  | 41.916    |
| -0.3474352E 02 | 0.7695955E 02  | 0.1240515E 03 | 139.867 | 17.483  | 0.015018 | 8  | 47.904    |
| -0.1441115E 02 | -0.8338470E 02 | 0.8478111E 02 | 259.527 | 28.836  | 0.313264 | 9  | 53.892    |
| 0.2467460E 02  | 0.1729008E 02  | 0.2492621E 02 | 35.293  | 3.529   | 0.003623 | 10 | 59.880    |

## FIXED HUB CHORD AT STA 6

HARMONIC ANALYSIS MODEL XM-51A SHIP 1002 T 45R CTR 250 FLT 511.0 TR 5

| SI             | EJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1015644E 05  |                |               |         |        |          |    |           |
| 0.9078787E 04  | 0.3154157E 05  | 0.2555886E 05 | 67.043  | 67.043 | 1.000000 | 1  | 5.988     |
| -0.1013735E 04 | 0.8235536E 05  | 0.8470285E 05 | 107.406 | 51.703 | 0.331273 | 2  | 11.976    |
| -0.1578351E 04 | -0.5577613E 02 | 0.1579034E 04 | 182.024 | 53.575 | 0.061756 | 3  | 17.964    |
| 0.2427227E 03  | -0.2368712E 03 | 0.3364071E 03 | 331.783 | 93.445 | 0.013379 | 4  | 23.952    |
| 0.1591954E 02  | -0.1191974E 03 | 0.1598690E 03 | 323.175 | 64.635 | 0.007778 | 5  | 29.940    |
| 0.1728045E 03  | 0.7564637E 02  | 0.1442380E 03 | 31.632  | 5.272  | 0.005641 | 6  | 35.928    |
| -0.1605361E 03 | 0.1341374E 03  | 0.3844158E 03 | 163.090 | 23.627 | 0.014035 | 7  | 41.916    |
| 0.2166779E 03  | -0.2860716E 03 | 0.3571326E 03 | 305.867 | 38.358 | 0.013564 | 8  | 47.904    |
| 0.6352573E 03  | 0.5729232E 03  | 0.7208780E 03 | 47.675  | 5.297  | 0.023186 | 9  | 53.892    |
| -0.1383250E 03 | 0.7701810E 02  | 0.1560717E 03 | 153.222 | 15.028 | 0.006139 | 10 | 59.880    |

# HARMONIC COMPONENTS OF FLIGHT TEST DATA CASE 44 V= 173 KTS n= 1.69 g

## BLADE FLAP AT STA 113

HARMONIC ANALYSIS MODEL NM-511 SHIP 1002 T 450 CTR 250 FLT 511.0 TR 27

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.1756267E 03 | -0.1185372E 04 | 0.1749107E 04 | 317.157 | 317.157 | 1.000000 | 1  | 5.988     |
| 0.1292466E 04  | 0.9003470E 03  | 0.9051804E 03 | 95.923  | 47.961  | 0.517510 | 2  | 11.976    |
| -0.4336908E 02 | 0.2731271E 03  | 0.3088845E 03 | 44.614  | 14.871  | 0.222333 | 3  | 17.964    |
| 0.7878313E 03  | -0.6992235E 01 | 0.1043353E 02 | 318.656 | 79.664  | 0.005965 | 4  | 23.952    |
| 0.7872907E 01  | -0.1548947E 02 | 0.3530922E 02 | 213.501 | 47.750  | 0.020107 | 5  | 29.940    |
| -0.3744400E 03 | 0.1477813E 02  | 0.1443117E 02 | 93.243  | 15.541  | 0.078233 | 6  | 35.928    |
| -0.0151618E 03 | 0.5665525E 02  | 0.8312439E 02 | 47.004  | 6.143   | 0.047524 | 7  | 41.916    |
| 0.6778911E 02  | 0.2740133E 02  | 0.8997069E 02 | 140.928 | 20.116  | 0.051443 | 8  | 47.904    |
| -0.8574068E 02 | 0.3645352E 02  | 0.5832179E 02 | 141.381 | 15.676  | 0.033172 | 9  | 53.892    |
| -0.4514297E 02 | 0.1244010E 02  | 0.1617889E 02 | 120.530 | 12.953  | 0.020221 | 10 | 59.880    |

## BLADE FLAP AT STA 157

HARMONIC ANALYSIS MODEL NM-511 SHIP 1002 T 450 CTR 250 FLT 511.0 TR 31

| AJ             | HJ             | CJ            | PHIJC   | PSIJC   | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|---------|----------|----|-----------|
| -0.9488127E 03 | -0.1117533E 04 | 0.1303220E 04 | 300.962 | 300.962 | 1.000000 | 1  | 5.988     |
| 0.8714663E 03  | 0.4421817E 03  | 0.4696253E 03 | 73.817  | 36.908  | 0.353298 | 2  | 11.976    |
| 0.1793332E 03  | 0.3193336E 03  | 0.8460237E 03 | 22.176  | 7.392   | 0.649179 | 3  | 17.964    |
| 0.7874404E 03  | 0.3005068E 02  | 0.3110637E 02 | 75.312  | 18.633  | 0.323869 | 4  | 23.952    |
| 0.7873974E 01  | -0.1963853E 03 | 0.1776209E 03 | 216.955 | 43.371  | 0.251240 | 5  | 29.940    |
| -0.7618871E 03 | -0.1755770E 03 | 0.1793202E 03 | 281.093 | 46.949  | 0.177548 | 6  | 35.928    |
| 0.3450384E 02  | -0.3561460E 02 | 0.1151219E 03 | 197.989 | 28.284  | 0.385493 | 7  | 41.916    |
| -0.1066847E 03 | -0.1066847E 03 | 0.2316540E 03 | 332.619 | 41.577  | 0.177745 | 8  | 47.904    |
| 0.7357024E 03  | -0.5775711E 02 | 0.9074265E 02 | 327.337 | 36.376  | 0.076536 | 9  | 53.892    |
| 0.9431648E 02  | -0.3577457E 02 | 0.5126093E 02 | 307.111 | 33.911  | 0.339334 | 10 | 59.880    |

## BLADE CHORD AT STA 65

HARMONIC ANALYSIS MODEL NM-511 SHIP 1002 T 450 CTR 250 FLT 511.0 TR 29

| AJ             | HJ             | CJ            | PHIJC   | PSIJC  | CJ/CJMAX | J  | FREQUENCY |
|----------------|----------------|---------------|---------|--------|----------|----|-----------|
| 0.1491603E 04  | 0.1641319E 05  | 0.1732632E 05 | 74.577  | 74.577 | 1.000000 | 1  | 5.988     |
| 0.4552536E 04  | 0.2400375E 04  | 0.3348216E 04 | 133.979 | 66.989 | 0.196649 | 2  | 11.976    |
| -0.2774965E 04 | -0.6378315E 03 | 0.1489270E 04 | 205.360 | 68.453 | 0.077466 | 3  | 17.964    |
| 0.1249714E 04  | 0.1323185E 03  | 0.6276563E 03 | 12.162  | 3.336  | 0.036864 | 4  | 23.952    |
| 0.6136167E 03  | -0.7710000E 02 | 0.3552155E 03 | 194.146 | 38.929 | 0.018531 | 5  | 29.940    |
| -0.7059545E 03 | 0.5330458E 03  | 0.7257075E 03 | 46.116  | 7.696  | 0.342623 | 6  | 35.928    |
| 0.4070623E 03  | 0.1194915E 03  | 0.1623635E 03 | 47.533  | 6.786  | 0.339518 | 7  | 41.916    |
| 0.1094002E 03  | 0.4784370E 02  | 0.6152272E 02 | 129.954 | 16.119 | 0.003613 | 8  | 47.904    |
| -0.3867924E 02 | -0.1141055E 03 | 0.1367174E 03 | 235.343 | 26.149 | 0.038147 | 9  | 53.892    |
| -0.7898264E 02 | -0.3352435E 02 | 0.5545607E 02 | 326.629 | 32.663 | 0.333257 | 10 | 59.880    |

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## APPENDIX II

### CORRELATION DATA

Harmonic correlation data for REXOR analysis and flight test results are tabulated in this appendix for AH-56A and XH-51A steady trim cases. The 37 cases for which REXOR calculations were made are included. A complete listing of the test conditions is available in Table I.

Data are provided for the steady (mean) component and the magnitude and phase of 1P and 2P cyclic components of the rotor loads. The AH-56A loads include the flap and chord moments on the fixed hub at station 18; blade flap moments at a maximum of five stations; the blade chord moment at a maximum of three stations; the torsion moment at station 131.5; and the feather moment. Fixed hub flap and chord moments at station 6 are presented for the XH-51A vehicle, along with the flap moments at stations 115 and 157, the blade chord moment at station 45, and the feathering moment. No XH-51A blade torsion load measurements were available from flight test data. The tables also show correlation of the steady (collective) and 1P cyclic feathering angles.

All loads are presented in inch-pounds, and the angles are presented in degrees. Positive directions are flap up, lag aft, and blade nose up. All loads and the cyclic blade angle were measured on blade 1, except the fixed hub flap moment at station 6 on the XH-51A compound was taken from blade 2. A 90-degree adjustment was made to the phase angles for these data so that the data listed in the tables are effective for blade 1 in all cases. The feathering angle measurements were lagging due to galvanometer response characteristics, so the phase angle of the feather angle data has been corrected by 30 degrees to give the "true" value listed in the tables.

AH-56A CORRELATION DATA CASE 1

AIR SPEED = 154 KEAS; PRESSURE ALTITUDE = 3920 FT; AMBIENT TEMPERATURE = 75 °F

ROTOR LIFT = 7850 LB; SHAFT MOMENT = 100,000 IN-LB FLAP UP AT 105 DEG

LOAD FACTOR = 1.00 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 2.0 DEG, TEST 2.3 DEG

| PARAMETER                 | UNITS  | STEADY  |         | I-P MAGNITUDE |         | I-P PHASE |      | 2-P MAGNITUDE |        | 2-P PHASE |      |
|---------------------------|--------|---------|---------|---------------|---------|-----------|------|---------------|--------|-----------|------|
|                           |        | REXOR   | TEST    | REXOR         | TEST    | REXOR     | TEST | REXOR         | TEST   | REXOR     | TEST |
| Blade Feather Angle       | deg    | 5.9     | 5.6     | 1.7           | 3.8     | 287       | 292  | -             | -      | -         | -    |
| Blade Feather Moment      | in.-lb | 160     | 100     | 2400          | 3320    | -16       | 5    | 1340          | 3560   | 7         | 66   |
| Fixed Hub Flap @ Sta 18   | in.-lb | -33,300 | -33,300 | 33,400        | 24,100  | 104       | 90   | 16,300        | 16,000 | 81        | 141  |
| Fixed Hub Chord @ Sta 18  | in.-lb | 57,900  | 50,500  | 74,300        | 100,800 | 81        | 96   | 8,600         | 8800   | -11       | 59   |
| Blade Flap @ Sta 130.5    | in.-lb | 32,600  | 7500    | 7800          | 5000    | 247       | 320  | 4500          | 4400   | -6        | 53   |
| Blade Flap @ Sta 205      | in.-lb | -21,400 | -8300   | 4200          | 4500    | 273       | 121  | 2200          | 1700   | 69        | 146  |
| Blade Flap @ Sta 235      | in.-lb | -22,600 | -4220   | 1350          | 1640    | 356       | 115  | 4870          | 130    | 76        | 58   |
| Blade Flap @ Sta 270      | in.-lb | -12,700 | 330     | 4040          | 720     | 67        | -17  | 5140          | 800    | 78        | 37   |
| Blade Chord @ Sta 103     | in.-lb | 138,000 | 207,000 | 41,400        | 50,000  | 81        | 101  | 4200          | 4600   | -11       | 39   |
| Blade Chord @ Sta 174     | in.-lb | 24,000  | 20,000  | 20,300        | 26,900  | 81        | 101  | 2500          | 2400   | -12       | 32   |
| Blade Chord @ Sta 235     | in.-lb | -14,000 | -26,100 | 7200          | 6800    | 80        | 103  | 1300          | 1200   | -11       | 70   |
| Blade Torsion @ Sta 131.5 | in.-lb | -5160   | 480     | 270           | 3090    | 21        | 52   | 570           | 1360   | 12        | 63   |



# AH-56A CORRELATION DATA CASE 2

AIR SPEED = 121.5 KEAS; PRESSURE ALTITUDE = 4190 FT; AMBIENT TEMPERATURE = 75 °F

ROTOR LIFT = 12600 LB; SHAFT MOMENT = 53700 IN-LB FLAP UP AT 78 DEG

LOAD FACTOR = 1.0 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 2.2 DEG, TEST 2.9 DEG

| PARAMETER                 | UNITS  | STEADY  |          | I-P MAGNITUDE |         |       | I-P PHASE |      |         | 2-P MAGNITUDE |         |       | 2-P PHASE |      |      |
|---------------------------|--------|---------|----------|---------------|---------|-------|-----------|------|---------|---------------|---------|-------|-----------|------|------|
|                           |        | REXOR   | TEST     | REXOR         | TEST    | REXOR | REXOR     | TEST | TEST    | REXOR         | TEST    | REXOR | REXOR     | TEST | TEST |
| Blade Feather Angle       | deg    | 8.5     | 8.1      | 3.9           | 5.2     | 287   | 287       | 287  | -       | -             | -       | -     | -         | -    | -    |
| Blade Feather Moment      | in.-lb | 1840    | 480      | 1360          | 2860.   | 310   | 6         | 6    | 2150    | 560           | 2150    | 20    | 20        | 68   | 68   |
| Fixed Hub Flap @ Sta 18   | in.-lb | 270     | -6620.   | 18,600        | 14,500. | 80    | 57        | 57   | 8680    | 1340          | 8680    | 81    | 81        | 141  | 141  |
| Fixed Hub Chord @ Sta 18  | in.-lb | 63,700  | 55,200.  | 53,300        | 94,600. | 58    | 74        | 74   | 11,400. | 20,600        | 11,400. | 8     | 8         | 35   | 35   |
| Blade Flap @ Sta 130.5    | in.-lb | 41,800  | 9660.    | 7800          | 4700.   | 263   | 320       | 320  | 2800    | 3900          | 2800    | -3    | -3        | 58   | 58   |
| Blade Flap @ Sta 205      | in.-lb | -25,200 | -7300.   | 3000          | 4100.   | 268   | 118       | 118  | 2200    | 3400          | 2200    | 81    | 81        | 161  | 161  |
| Blade Flap @ Sta 235      | in.-lb | -31,200 | -1580.   | 840           | 1620.   | 69    | 100       | 100  | 1620    | 6100          | 1620    | 82    | 82        | 6    | 6    |
| Blade Flap @ Sta 270      | in.-lb | -21,700 | 2800.    | 3710          | 900.    | 85    | 359       | 359  | 614     | 5800          | 614     | 8     | 8         | 8    | 8    |
| Blade Chord @ Sta 103     | in.-lb | 153,000 | 216,000. | 35,000        | 46,500. | 65    | 81        | 81   | 4340    | 10,400        | 4340    | 9     | 9         | 45   | 45   |
| Blade Chord @ Sta 174     | in.-lb | 23,500  | 23,400.  | 17,000        | 23,400  | 64    | 80        | 80   | 1050.   | 5900          | 1050.   | 7     | 7         | 55   | 55   |
| Blade Chord @ Sta 235     | in.-lb | -13,200 | -25,500. | 5600          | 6400.   | 58    | 79        | 79   | 1900    | 2700          | 1900    | 4     | 4         | 36   | 36   |
| Blade Torsion @ Sta 131.5 | in.-lb | -6450   | 135      | 1190          | 2700    | 49    | 46        | 46   | 1400    | 508           | 1400    | 33    | 33        | 79   | 79   |



# AH-56A CORRELATION DATA CASE 3

AIR SPEED = 190 KEAS; PRESSURE ALTITUDE = 3250 FT; AMBIENT TEMPERATURE = 78 °F

ROTOR LIFT = 4500 LB; SHAFT MOMENT = 122,000 IN-LB FLAP UP AT 104 DEG

LOAD FACTOR = 1.0 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 0.3 DEG, TEST 0.8 DEG

| PARAMETER                 | UNITS  | STEADY  |         | I-P MAGNITUDE |          | I-P PHASE |      | 2-P MAGNITUDE |        | 2-P PHASE |      |
|---------------------------|--------|---------|---------|---------------|----------|-----------|------|---------------|--------|-----------|------|
|                           |        | REXOR   | TEST    | REXOR         | TEST     | REXOR     | TEST | REXOR         | TEST   | REXOR     | TEST |
| Blade Feather Angle       | deg    | 5.2     | 5.4     | 0.8           | 3.6      | 282       | 287  | -             | -      | -         | -    |
| Blade Feather Moment      | in.-lb | 1780    | -300    | 3460          | 3520.    | 243       | 357  | 1310          | 5300.  | 5         | 67   |
| Fixed Hub Flap @ Sta 18   | in.-lb | -58,900 | -46,500 | 39,500        | 29,000.  | 103       | 89   | 17,400        | 22,000 | 82        | 140  |
| Fixed Hub Chord @ Sta 18  | in.-lb | 65,400  | 52,300. | 74,700        | 105,000. | 85        | 98   | 5600          | 6100.  | 1         | 52   |
| Blade Flap @ Sta 130.5    | in.-lb | 26,800  | 6900    | 9300          | 4700     | 241       | 330  | 6000          | 5200   | -6        | 47   |
| Blade Fla. @ Sta 205      | in.-lb | -19,100 | -9500   | 6000          | 4400     | 268       | 119  | 1500          | 1700   | 29        | 140  |
| Blade Flap @ Sta 235      | in.-lb | -17,400 | -5300   | 1930          | 1850     | 320       | 94   | 3000          | 750    | 69        | 26   |
| Blade Flap @ Sta 270      | in.-lb | -7400   | -1030.  | 3960          | 400      | 59        | 345  | 3740          | 1400   | 77        | 43   |
| Blade Chord @ Sta 103     | in.-lb | 160,000 | 210,000 | 41,000        | 51,000.  | 85        | 105  | 2500          | 1800.  | 6         | 58   |
| Blade Chord @ Sta 174     | in.-lb | 26,500  | 21,500. | 20,200        | 27,000   | 84        | 103  | 1200          | 1200   | 3         | 58   |
| Blade Chord @ Sta 235     | in.-lb | -13,400 | -26,000 | 7300          | 6800     | 84        | 100  | 800           | 150    | -1        | 145  |
| Blade Torsion @ Sta 131.5 | in.-lb | -4480   | 560     | 210           | 3000.    | 240       | 56   | 520           | 2600.  | 6         | 68   |

AH-56A CORRELATION DATA CASE 4

AIR SPEED = 163.5 KEAS; PRESSURE ALTITUDE = 3460 FT; AMBIENT TEMPERATURE = 68°F

ROTOR LIFT = 9200 LB; SHAFT MOMENT = 170,000. IN.-LB FLAP UP AT 134 DEG

LOAD FACTOR = 1.00 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 1.2 DEG, TEST 1.8 DEG

| PARAMETER                 | UNITS  | STEADY  |          | I-P MAGNITUDE |         | I-P PHASE |      | 2-P MAGNITUDE |         | 2-P PHASE |      |
|---------------------------|--------|---------|----------|---------------|---------|-----------|------|---------------|---------|-----------|------|
|                           |        | REXOR   | TEST     | REXOR         | TEST    | REXOR     | TEST | REXOR         | TEST    | REXOR     | TEST |
| Blade Feather Angle       | deg    | 7.9     | 7.7      | 2.3           | 4.6     | 284       | 279  | -             | -       | -         | -    |
| Blade Feather Moment      | in.-lb | -710    | 2100.    | 2120          | 2170.   | 224       | 5    | 1550          | 4350.   | 12        | 65   |
| Fixed Hub Flap @ Sta 18   | in.-lb | -32,600 | -28,000. | 53,500        | 39,600  | 130       | 132  | 21,000        | 11,400  | 79        | 137  |
| Fixed Hub Chord @ Sta 18  | in.-lb | 76,800  | 27,400   | 63,300        | 84,000. | 91        | 91   | 11,200        | 11,100. | -20       | 163  |
| Blade Flap @ Sta 130.5    | in.-lb | 34,700  | 12,200.  | 7800          | 3150.   | 229       | 305  | 5800          | 4600    | -7        | 56   |
| Blade Flap @ Sta 174      | in.-lb | -6500   | 670.     | 7900          | 5300.   | 262       | 295. | 2500          | 4400    | 4         | 53   |
| Blade Flap @ Sta 205      | in.-lb | -21,300 | -10,000. | 5540          | 4900    | 285       | 115  | 3420          | 3500    | 66        | 155  |
| Blade Flap @ Sta 235      | in.-lb | -23,900 | -2700    | 3230          | 2500    | 336       | 104  | 7090          | 2300    | 73        | 165  |
| Blade Flap @ Sta 270      | in.-lb | -14,600 | 800      | 4240          | 750     | 46        | 339  | 7180          | 1400    | 75        | 170  |
| Blade Chord @ Sta 103     | in.-lb | 158,000 | 228,000  | 35,000        | 39,500  | 89        | 94   | 5500          | 7700    | 157       | 165  |
| Blade Chord @ Sta 174     | in.-lb | 26,100  | 17,500   | 17,400        | 23,700  | 88        | 93   | 3000          | 6000    | 157       | 152  |
| Blade Chord @ Sta 235     | in.-lb | -12,600 | -21,500  | 6000          | 6100    | 89        | 9    | 1700          | 1400    | 161       | 156  |
| Blade Torsion @ Sta 131.5 | in.-lb | -5580   | 750      | 630           | 2100    | 340       | 33   | 650           | 2000    | 15        | 60   |

# AH-56A CORRELATION DATA CASE 5

AIR SPEED = 165 KEAS; PRESSURE ALTITUDE = 3400 FT; AMBIENT TEMPERATURE = 69 °F

ROTOR LIFT = 9400 LB; SHAFT MOMENT = 205,000 IN.-LB FLAP UP AT 141 DEG

LOAD FACTOR = 1.13 g's; FUSELAGE ANGLE OF ATTACK; REXOR = -1.2 DEG, TEST -1.6 DEG

| PARAMETER                 | UNITS  | STEADY  |         | I-P MAGNITUDE |        | I-P PHASE |      | 2-P MAGNITUDE |        | 2-P PHASE |      |
|---------------------------|--------|---------|---------|---------------|--------|-----------|------|---------------|--------|-----------|------|
|                           |        | REXOR   | TEST    | REXOR         | TEST   | REXOR     | TEST | REXOR         | TEST   | REXOR     | TEST |
| Blade Feather Angle       | deg    | 8.2     | 7.8     | 2.2           | 4.6    | 286       | 280  | -             | -      | -         | -    |
| Blade Feather Moment      | in.-lb | -160    | 3,500   | 2480          | 1670   | 199       | 33   | 1600          | 4650   | 15        | 66   |
| Fixed Hub Flap @ Sta 18   | in.-lb | -25,800 | -22,000 | 66,700        | 48,000 | 137       | 141  | 21,700        | 12,200 | 78        | 143  |
| Fixed Hub Chord @ Sta 11  | in.-lb | 83,400  | 17,900  | 52,700        | 78,000 | 92        | 83   | 11,800        | 13,900 | 152       | 158  |
| Blade Flap @ Sta 130.5    | in.-lb | 35,600  | 13,600  | 8500          | 3200   | 226       | 300  | 5900          | 5300   | -6        | 57   |
| Blade Flap @ Sta 174      | in.-lb | -6500   | 820     | 8600          | 5600   | 264       | 293  | 2500          | 5000   | 7         | 51   |
| Blade Flap @ Sta 205      | in.-lb | -22,300 | -10,300 | 6900          | 5600   | 288       | 115  | 3800          | 4000   | 65        | 153  |
| Blade Flap @ Sta 235      | in.-lb | -25,600 | -1250   | 4700          | 3200   | 325       | 108  | 7400          | 2500   | 72        | 159  |
| Blade Flap @ Sta 270      | in.-lb | -16,100 | 1300    | 4100          | 660    | 30        | 24   | 7400          | 1300   | 74        | 164  |
| Blade Chord @ Sta 103     | in.-lb | 158,000 | 230,000 | 29,400        | 36,500 | 87        | 85   | 6300          | 9600   | 148       | 158  |
| Blade Chord @ Sta 174     | in.-lb | 27,100  | 15,600  | 14,800        | 22,000 | 86        | 86   | 3400          | 8000   | 149       | 147  |
| Blade Chord @ Sta 235     | in.-lb | -12,000 | -21,000 | 4900          | 5300   | 88        | 87   | 1800          | 1800   | 155       | 153  |
| Blade Torsion @ Sta 131.5 | in.-lb | -5700   | 700     | 800           | 3200   | -20       | 32   | 590           | 2200   | 14        | 61   |

# AH-56A CORRELATION DATA CASE 6

AIRSPED = 165.5 KEAS; PRESSURE ALTITUDE = 3260 FT; AMBIENT TEMPERATURE = 69 °F

ROTOR LIFT = 13,400 LB; SHAFT MOMENT = 293,000 IN.-LB FLAP UP AT 153 DEG

LOAD FACTOR = 1.42 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 0.0 DEG, TEST -1.0 DEG

| PARAMETER                 | UNITS  | STEADY  |         | I-P MAGNITUDE |        |      | I-P PHASE |      |      | 2-P MAGNITUDE |        |      | 2-P PHASE |      |      |
|---------------------------|--------|---------|---------|---------------|--------|------|-----------|------|------|---------------|--------|------|-----------|------|------|
|                           |        | REXOR   | TEST    | REXOR         | TEST   | TEST | REXOR     | TEST | TEST | REXOR         | TEST   | TEST | REXOR     | TEST | TEST |
| Blade Feather Angle       | deg    | 8.3     | 8.1     |               | 2.0    | 4.5  | 287       | 276  |      | -             |        |      |           |      |      |
| Blade Feather Moment      | in.-lb | 1700    | 4400    | 3600          | 3720   |      | 179       | 97   |      | 1740          | 5800   |      | 22        |      | 60   |
| Fixed Hub Flap @ Sta 18   | in.-lb | -3500   | -4750   | 91,300        | 69,000 |      | 147       | 154  |      | 24,400        | 14,000 |      | 79        |      | 140  |
| Fixed Hub Chord @ Sta 18  | in.-lb | 58,700  | 18,700  | 28,700        | 48,000 |      | 92        | 26   |      | 26,000        | 36,300 |      | 150       |      | 157  |
| Blade Flap @ Sta 130.5    | in.-lb | 39,100  | 15,000  | 8900          | 3700   |      | 224       | 280  |      | 6100          | 6900   |      | -7        |      | 57   |
| Blade Flap @ Sta 174      | in.-lb | -8300   | 1000    | 9300          | 6300   |      | 273       | 291  |      | 2200          | 6600   |      | 11        |      | 52   |
| Blade Flap @ Sta 205      | in.-lb | -27,700 | -9000   | 8800          | 6500   |      | 299       | 117  |      | 5000          | 5500   |      | 67        |      | 150  |
| Blade Flap @ Sta 235      | in.-lb | -32,500 | 200     | 7200          | 4100   |      | 326       | 112  |      | 9100          | 3500   |      | 72        |      | 155  |
| Blade Flap @ Sta 270      | in.-lb | -21,600 | 2700    | 5100          | 1050   |      | 15        | 76   |      | 8800          | 1900   |      | 74        |      | 161  |
| Blade Chord @ Sta 103     | in.-lb | 155,000 | 227,000 | 17,800        | 24,000 |      | 77        | 17   |      | 14,000        | 23,500 |      | 149       |      | 156  |
| Blade Chord @ Sta 174     | in.-lb | 24,000  | 16,300  | 9000          | 10,400 |      | 80        | 44   |      | 7400          | 16,700 |      | 149       |      | 151  |
| Blade Chord @ Sta 235     | in.-lb | -13,300 | -21,000 | 2230          | 2550   |      | 86        | 20   |      | 3640          | 4650   |      | 153       |      | 157  |
| Blade Torsion @ Sta 131.5 | in.-lb | -6330   | 200     | 1230          | 4100   |      | -17       | 43   |      | 640           | 2500   |      | 11        |      | 51   |

# AH-56A CORRELATION DATA CASE 7

AIRSPPEED = 165 KEAS; PRESSURE ALTITUDE = 3260 FT; AMBIENT TEMPERATURE = 69 °F

ROTOR LIFT = 14,900 LB; SHAFT MOMENT = 311,000 IN.-LB FLAP UP AT 158 DEG

LOAD FACTOR = 1.60 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 0.5 DEG, TEST -0.2 DEG

| PARAMETER                 | UNITS  | STEADY  |         | I-P MAGNITUDE |        | I-P PHASE |      | 2-P MAGNITUDE |        | 2-P PHASE |      |
|---------------------------|--------|---------|---------|---------------|--------|-----------|------|---------------|--------|-----------|------|
|                           |        | REXOR   | TEST    | REXOR         | TEST   | REXOR     | TEST | REXOR         | TEST   | REXOR     | TEST |
| Blade Feather Angle       | deg    | 8.6     | 8.2     | 2.1           | 4.8    | 281       | 277  | -             | -      | -         | -    |
| Blade Feather Moment      | in.-lb | 2150    | 4600    | 3950          | 5740   | 165       | 97   | 1740          | 5300   | 23        | 56   |
| Fixed Hub Flap @ Sta 18   | in.-lb | 4500    | 3420    | 99,400        | 74,400 | 153       | 158  | 26,500        | 14,600 | 79        | 138  |
| Fixed Hub Chord @ Sta 18  | in.-lb | 65,300  | 14,700  | 9300          | 5400   | 100       | -15  | 39,100        | 55,300 | 152       | 158  |
| Blade Flap @ Sta 130.5    | in.-lb | 39,700  | 15,700  | 9500          | 4200   | 228       | 276  | 6200          | 7300   | 171       | 58   |
| Blade Flap @ Sta 174      | in.-lb | -8700   | 1300    | 10,000        | 6700   | 278       | 293  | 1900          | 7400   | 17        | 55   |
| Blade Flap @ Sta 205      | in.-lb | -29,300 | -8800   | 10,000        | 7100   | 303       | 119  | 5900          | 6300   | 67        | 150  |
| Blade Flap @ Sta 235      | in.-lb | -34,800 | 680     | 8500          | 4950   | 326       | 116  | 10,300        | 4300   | 71        | 154  |
| Blade Flap @ Sta 270      | in.-lb | -23,500 | 3500    | 5800          | 1400   | 76        | 102  | 9700          | 2250   | 73        | 158  |
| Blade Chord @ Sta 103     | in.-lb | 154,000 | 224,000 | 8800          | 30,000 | 56        | 341  | 21,200        | 34,400 | 151       | 158  |
| Blade Chord @ Sta 174     | in.-lb | 25,000  | 15,100  | 4100          | 9200   | 66        | 358  | 11,200        | 23,300 | 151       | 154  |
| Blade Chord @ Sta 235     | in.-lb | -12,600 | -21,100 | 100           | 3250   | 30        | 325  | 5400          | 7000   | 153       | 157  |
| Blade Torsion @ Sta 131.5 | in.-lb | -6650   | -2400   | 1510          | 5200   | -1        | 47   | 840           | 2100   | 0         | 46   |

**AH-56A CORRELATION DATA CASE 8**

AIR SPEED = 204.5 KEAS; PRESSURE ALTITUDE = 4690 FT; AMBIENT TEMPERATURE = 43 °F

ROTOR LIFT = 3400 LB; SHAFT MOMENT = 152,300 IN-LB FLAP UP AT 130 DEG

LOAD FACTOR = 1.06 g's; FUSELAGE ANGLE OF ATTACK; REXOR = -1.8 DEG, TEST 0.4 DEG

[illegible]

**AH-56A CORRELATION DATA CASE 10**

AIR SPEED = 200.5 KEAS; PRESSURE ALTITUDE = 4250 FT; AMBIENT TEMPERATURE = 46 °F

ROTOR LIFT = 6400 LB: SHAFT MOMENT = 190,000 IN-LB FLAP UP AT 139 DEG

**LOAD FACTOR = 1.35 g's; FUSELAGE ANGLE OF ATTACK; REXOR = -0.9 DEG, TEST 1.9 DEG**

[illegible]



**21**

$$= 3087$$

630

**DEG**

[illegible]



## 12

30 27

**DEG**

DEG

[illegible]

## 13

3067

**131 DEG**

DEC

[illegible]

## 机

8 of

**CEG**

DEC

[illegible]

AIR SPEED = 120.5 KEAS; PRESSURE ALTITUDE = 3850 FT; AMBIENT TEMPERATURE = 51 °F  
 ROTOR LIFT = 10,700 LB; SHAFT MOMENT = 47,150 IN-LB FLAP UP AT 86 DEG  
 LOAD FACTOR = 0.93 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 1.7 DEG, TEST 0.2

[illegible]

## 17

**AIR SPEED = 121 KEAS; PRESSURE ALTITUDE = 4210 FT; AMBIENT TEMPERATURE = 50 °F**

[illegible]

AIR SPEED = 118.5 KEAS; PRESSURE ALTITUDE = 3790 FT; AMBIENT TEMPERATURE = 51°F  
 ROTOR LIFT = 13,100 LB; SHAFT MOMENT = 58,100 IN-LB FLAP UP AT 106 DEG  
 LOAD FACTOR = 1.12 g's; FUSELAGE ANGLE OF ATTACK; REXOR = -0.5 DEG, TEST 2.1

273

## 19

**AIR SPEED = 121.5 KEAS:      PRESSURE ALTITUDE = 4120      FT:      AMBIENT TEMPERATURE = 50 °F**

ROTOR LIFT = 15,000 LB; SHAFT MOMENT = 71,500 IN-LB FLAP UP AT 123 DEG

LOAD FACTOR = 1.26 g's; FUSELAGE ANGLE OF ATTACK: REXOR = 0.2 DEG, TEST 2.1 DEG

[illegible]

2

AIR SPEED = 120.5 KEAS; PRESSURE ALTITUDE = 3480 FT; AMBIENT TEMPERATURE = 53 °F

ROTOR LIFT = 16000 LB; SHAFT MOMENT = 76200 IN-LB FLAP UP AT 117 DEG

| LOAD FACTOR = | 1.45 | g's; | FUSELAGE ANGLE OF ATTACK; REXOR = | 0.4 | DEG, TEST | 3.4 | DEG |
|---------------|------|------|-----------------------------------|-----|-----------|-----|-----|
|               |      |      |                                   |     |           |     |     |

[illegible]



LOAD FACTOR = 1.66 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 1.6 DEG, TEST 5.1 DEG

276

24

○

**DEG**

#### 4.1 DEG

[illegible]

# AH-56A CORRELATION DATA CASE 25

AIR SPEED = 111 KEAS; PRESSURE ALTITUDE = 2190 FT; AMBIENT TEMPERATURE = 79 °F

ROTOR LIFT = 17500 LB; SHAFT MOMENT = 80000 IN-LB FLAP UP AT 55 DEG

LOAD FACTOR = 1.0 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 7.2 DEG, TEST 2.0 DEG

| PARAMETER                 | UNITS  | STEADY  |         | I-P MAGNITUDE |         | I-P PHASE |      | 2-P MAGNITUDE |        | 2-P PHASE |      |
|---------------------------|--------|---------|---------|---------------|---------|-----------|------|---------------|--------|-----------|------|
|                           |        | REXOR   | TEST    | REXOR         | TEST    | REXOR     | TEST | REXOR         | TEST   | REXOR     | TEST |
| BLADE FEATHER ANGLE       | deg    | 8.7     | 8.3     | 5.0           | 6.4     | 291       | 290  | -             | -      | -         | -    |
| BLADE FEATHER MOMENT      | in.-lb | 3700    | 1620    | 1880          | 3040    | 28        | 21   | 300           | 1570   | 170       | 80   |
| FIXED HUB FLAP @ STA 18   | in.-lb | 33,100  | 17,800  | 24,900        | 5900    | 58        | 54   | 13,300        | 3300   | 81        | 157  |
| FIXED HUB CHORD @ STA 18  | in.-lb | 59,800  | 73,800  | 68,700        | 103,000 | 22        | 53   | 41,106        | 21,400 | 8         | 28   |
| BLADE FLAP @ STA 130.5    | in.-lb | 45,700  | 12,800  | 9300          | 5300    | 271       | 328  | 3900          | 1850   | -1        | 77   |
| BLADE FLAP @ STA 174      | in.-lb | -6600   | 1700    | 7000          | 5000    | 264       | 308  | 470           | 3100   | 56        | 85   |
| BLADE FLAP @ STA 205      | in.-lb | -30,900 | -6400   | 2700          | 3900    | 255       | 120  | 4700          | 3600   | 82        | 179  |
| BLADE FLAP @ STA 235      | in.-lb | -39,000 | 1220    | 1600          | 2000    | 109       | 89   | 7706          | 2900   | 83        | 179  |
| BLADE FLAP @ STA 270      | in.-lb | -28,000 | -2500   | 4200          | 1180    | 95        | 8    | 7000          | 1600   | 83        | 1    |
| BLADE CHORD @ STA 103     | in.-lb | 150,000 | 173,000 | 37,500        | 27,000  | 35        | 33   | 21,100        | 7200   | 8         | 54   |
| BLADE CHORD @ STA 235     | in.-lb | 9400    | -24,800 | 11,400        | 7200    | 25        | 54   | 7900          | 2600   | 4         | 23   |
| BLADE TORSION @ STA 131.5 | in.-lb | -7600   | 250     | 2500          | 2600    | 54        | 38   | 680           | 1050   | 102       | 76   |

# AH-56A CORRELATION DATA CASE 26

AIR SPEED = 173 KEAS; PRESSURE ALTITUDE = 3470 FT; AMBIENT TEMPERATURE = 74 °F

ROTOR LIFT = 11,100 LB; SHAFT MOMENT = 124,250 IN-LB FLAP UP AT 109 DEG

LOAD FACTOR = 1.15 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 3.2 DEG, TEST 2.1 DEG

| PARAMETER                 | UNITS  | STEADY  |         | I-P MAGNITUDE |         | I-P PHASE |      | 2-P MAGNITUDE |        | 2-P PHASE |      |
|---------------------------|--------|---------|---------|---------------|---------|-----------|------|---------------|--------|-----------|------|
|                           |        | REXOR   | TEST    | REXOR         | TEST    | REXOR     | TEST | REXOR         | TEST   | REXOR     | TEST |
| BLADE FEATHER ANGLE       | deg    | 6.6     | 6.3     | 2.9           | 6.0     | 285       | 282  |               | .5     |           | 115  |
| BLADE FEATHER MOMENT      | in.-lb | 1300    | 1260    | 1670          | 3920    | 264       | 5    | 1550          | 5740   | 11        | 68   |
| FIXED FLAP @ STA 18       | in.-lb | -12,800 | -14,800 | 42,700        | 28,800  | 107       | 95   | 21,800        | 18,800 | 81        | 138  |
| FIXED HUB CHORD @ STA 18  | in.-lb | 52,900  | 52,000  | 79,800        | 116,500 | 82        | 83   | 24,500        | 11,500 | 174       | 8    |
| BLADE FLAP @ STA 130.5    | in.-lb | 34,800  | 9840    | 9900          | 5650    | 249       | 329  | 6900          | 6200   | 175       | 56   |
| BLADE FLAP @ STA 174      | in.-lb | -3400   | 1600    | 10,100        | 6350    | 262       | 307  | 2300          | 5500   | 10        | 58   |
| BLADE FLAP @ STA 205      | in.-lb | -24,400 | -8600   | 6300          | 6000    | 273       | 122  | 4500          | 3800   | 71        | 157  |
| BLADE FLAP @ STA 235      | in.-lb | -27,200 | -2500   | 2000          | 3300    | 319       | 105  | 8000          | 2300   | 76        | 170  |
| BLADE FLAP @ STA 270      | in.-lb | -16,700 | -1400   | 4000          | 1050    | 65        | 8    | 8300          | 1700   | 78        | 10   |
| BLADE CHORD @ STA 103     | in.-lb | 150,000 | 206,000 | 46,400        | 56,500  | 83        | 91   | 12,700        | 7400   | -6        | 1    |
| BLADE CHORD @ STA 235     | in.-lb | -13,700 | -27,700 | 7906          | 8900    | 81        | 90   | 3600          | 1400   | 171       | 177  |
| BLADE TORSION @ STA 131.5 | in.-lb | -5750   | 600     | 790           | 3700    | 38        | 37   | 780           | 2700   | 134       | 66   |

# AH-56A CORRELATION DATA CASE 27

AIR SPEED = 173.5 KEAS; PRESSURE ALTITUDE = 3330 FT; AMBIENT TEMPERATURE = 74 °F

ROTOR LIFT = 12,100 LB; SHAFT MOMENT = 132,000 IN-LB FLAP UP AT 122 DEG

LOAD FACTOR = 1.22 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 3.3 DEG, TEST 2.3 DEG

| PARAMETER                 | UNITS  | STEADY  |         | I-P MAGNITUDE |         | I-P PHASE |      | 2-P MAGNITUDE |        | 2-P PHASE |      |
|---------------------------|--------|---------|---------|---------------|---------|-----------|------|---------------|--------|-----------|------|
|                           |        | REXOR   | TEST    | REXOR         | TEST    | REXOR     | TEST | REXOR         | TEST   | REXOR     | TEST |
| BLADE FEATHER ANGLE       | deg    | 6.7     | 6.4     | 2.8           | 6.1     | 284       | 284  |               | .4     |           | 111  |
| BLADE FEATHER MOMENT      | in.-lb | 1550    | 1660    | 1590          | 3980    | 245       | 17   | 1720          | 5880   | 11        | 68   |
| FIXED HUB FLAP @ STA 18   | in.-lb | -7800   | -9950   | 44,500        | 29,300  | 118       | 103  | 23,100        | 20,600 | 81        | 138  |
| FIXED HUB CHORD @ STA 18  | in.-lb | 45,800  | 52,500  | 76,700        | 108,500 | 76        | 80   | 25,500        | 10,300 | 170       | 13   |
| BLADE FLAP @ STA 130.5    | in.-lb | 36,000  | 10,400  | 10,106        | 5900    | 247       | 332  | 7100          | 6300   | -5        | 58   |
| BLADE FLAP @ STA 174      | in.-lb | -8600   | 1640    | 10,300        | 6800    | 264       | 313  | 2200          | 5500   | 12        | 60   |
| BLADE FLAP @ STA 205      | in.-lb | -25,600 | -8350   | 6600          | 6300    | 278       | 124  | 5100          | 3500   | 71        | 159  |
| BLADE FLAP @ STA 235      | in.-lb | -28,900 | -2200   | 2600          | 3500    | 326       | 103  | 9400          | 2000   | 75        | 174  |
| BLADE FLAP @ STA 270      | in.-lb | -18,100 | -2200   | 4200          | 2400    | 60        | 45   | 9000          | 1740   | 77        | 19   |
| BLADE CHORD @ STA 103     | in.-lb | 150,000 | 205,000 | 45,200        | 52,500  | 77        | 87   | 13,300        | 6450   | 169       | 3    |
| BLADE CHORD @ STA 235     | in.-lb | -14,100 | -27,400 | 7700          | 8600    | 74        | 89   | 3900          | 1700   | 167       | 5    |
| BLADE TORSION @ STA 131.5 | in.-lb | -6010   | 500     | 1020          | 3900    | 34        | 42   | 830           | 2900   | 11        | 69   |

# AH-56A CORRELATION DATA CASE 28

AIR SPEED = 173 KEAS, PRESSURE ALTITUDE = 3270 FT; AMBIENT TEMPERATURE = 75 °F

ROTOR LIFT = 14,700 LB; SHAFT MOMENT = 142,000 IN-LB FLAP UP AT 128 DEG

LOAD FACTOR = 1.45 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 4.9 DEG, TEST 4.2 DEG

| PARAMETER                 | UNITS  | STEADY  |         | I-P MAGNITUDE |        | I-P PHASE |      | 2-P MAGNITUDE |        | 2-P PHASE |      |
|---------------------------|--------|---------|---------|---------------|--------|-----------|------|---------------|--------|-----------|------|
|                           |        | REXOR   | TEST    | REXOR         | TEST   | REXOR     | TEST | REXOR         | TEST   | REXOR     | TEST |
| BLADE FEATHER ANGLE       | deg    | 7.0     | 6.7     | 3.5           | 6.6    | 282       | 286  |               | .5     |           | 119  |
| BLADE FEATHER MOMENT      | in.-lb | 2110    | 2740    | 680           | 4350   | 104       | 51   | 2060          | 6160   | 10        | 65   |
| FIXED HUB FLAP @ STA 18   | in.-lb | 7700    | 1830    | 48,300        | 29,300 | 122       | 115  | 25,800        | 23,300 | 80        | 137  |
| FIXED HUB CHORD @ STA 18  | in.-lb | 45,000  | 47,800  | 54,900        | 93,300 | 72        | 57   | 45,400        | 21,000 | 169       | 11   |
| BLADE FLAP @ STA 130.5    | in.-lb | 37,800  | 11,500  | 10,500        | 6600   | 249       | 329  | 8800          | 7000   | 4         | 57   |
| BLADE FLAP @ STA 174      | in.-lb | -9000   | 1500    | 11,200        | 7500   | 265       | 312  | 2600          | 6700   | 18        | 56   |
| BLADE FLAP @ STA 205      | in.-lb | -28,000 | -7800   | 7900          | 7000   | 278       | 123  | 7000          | 4400   | 70        | 155  |
| BLADE FLAP @ STA 235      | in.-lb | -32,500 | -500    | 3600          | 4200   | 311       | 106  | 12,100        | 2400   | 74        | 170  |
| BLADE FLAP @ STA 270      | in.-lb | -21,100 | 1450    | 3706          | 1600   | 53        | 47   | 11,200        | 2100   | 76        | 12   |
| BLADE CHORD @ STA 103     | in.-lb | 147,000 | 206,000 | 35,206        | 43,000 | 73        | 64   | 24,000        | 12,600 | 168       | 8    |
| BLADE CHORD @ STA 235     | in.-lb | -13,400 | -27,400 | 5700          | 6700   | 68        | 66   | 6800          | 3100   | 166       | 5    |
| BLADE TORSION @ STA 131.5 | in.-lb | -6880   | 230     | 1956          | 4750   | 48        | 48   | 1250          | 3200   | 3         | 60   |

# AH-56A CORRELATION DATA CASE 29

AIR SPEED = 170.5 KEAS; PRESSURE ALTITUDE = 3150 FT; AMBIENT TEMPERATURE = 75 °F

ROTOR LIFT = 17,200 LB; SHAFT MOMENT = 152,600 IN-LB FLAP UP AT 137 DEG

LOAD FACTOR = 1.62 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 7.6 DEG, TEST 5.6 DEG

| PARAMETER                 | UNITS  | STEADY  |         | 1-P MAGNITUDE |        | 1-P PHASE |      | 2-P MAGNITUDE |        | 2-P PHASE |      |
|---------------------------|--------|---------|---------|---------------|--------|-----------|------|---------------|--------|-----------|------|
|                           |        | REXOR   | TEST    | REXOR         | TEST   | REXOR     | TEST | REXOR         | TEST   | REXOR     | TEST |
| BLADE FEATHER ANGLE       | deg    | 7.2     | 6.9     | 4.6           | 6.9    | 280       | 286  | -             | -      | -         | -    |
| BLADE FEATHER MOMENT      | in.-lb | 2180    | 3650    | 3200          | 6100   | 81        | 69   | 1890          | 5500   | 14        | 59   |
| FIXED HUB FLAP @ STA 18   | in.-lb | 22,200  | 13,300  | 46,400        | 29,400 | 122       | 132  | 32,900        | 23,000 | 80        | 134  |
| FIXED HUB CHORD @ STA 18  | in.-lb | 40,200  | 43,700  | 27,200        | 86,500 | 32        | 31   | 74,800        | 26,000 | 170       | 4    |
| BLADE FLAP @ STA 130.5    | in.-lb | 38,800  | 12,800  | 11,300        | 7200   | 253       | 325  | 10,200        | 7200   | 175       | 57   |
| BLADE FLAP @ STA 174      | in.-lb | -10,100 | 1830    | 12,000        | 8150   | 266       | 312  | 2500          | 6800   | 24        | 56   |
| BLADE FLAP @ STA 205      | in.-lb | -30,800 | -7250   | 8500          | 7400   | 275       | 121  | 9600          | 4950   | 72        | 155  |
| BLADE FLAP @ STA 235      | in.-lb | -36,000 | 1120    | 3700          | 4900   | 300       | 101  | 16,200        | 2900   | 75        | 170  |
| BLADE FLAP @ STA 270      | in.-lb | -24,000 | 1600    | 3500          | 1200   | 57        | 86   | 14,800        | 1400   | 76        | 4    |
| BLADE CHORD @ STA 103     | in.-lb | 145,000 | 205,600 | 21,700        | 40,800 | 50        | 35   | 39,900        | 16,700 | 170       | 1    |
| BLADE CHORD @ STA 235     | in.-lb | -12,800 | -27,000 | 4000          | 6100   | 32        | 38   | 11,200        | 4300   | 166       | 177  |
| BLADE TORSION @ STA 131.5 | in.-lb | -8060   | -300    | 3170          | 5700   | 58        | 54   | 1546          | 2900   | 9         | 53   |



# AH-56A CORRELATION DATA CASE 30

AIR SPEED = 122.5 KEAS; PRESSURE ALTITUDE = 3860 FT; AMBIENT TEMPERATURE = 73 °F

ROTOR LIFT = 14,600 LB; SHAFT MOMENT = 71,100 IN-LB FLAP UP AT 87 DEG

LOAD FACTOR = 0.99 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 7.0 DEG, TEST = 3.9 DEG

| PARAMETER                 | UNITS    | STEADY  |         | I-P MAGNITUDE |         | I-P PHASE |      | 2-P MAGNITUDE |      | 2-P PHASE |      |
|---------------------------|----------|---------|---------|---------------|---------|-----------|------|---------------|------|-----------|------|
|                           |          | REXOR   | TEST    | REXOR         | TEST    | REXOR     | TEST | REXOR         | TEST | REXOR     | TEST |
| Blade Feather Angle       | deg      | 7.3     | 6.8     | 3.9           | 5.5     | 289       | 288  | -             | -    | -         | -    |
| Blade Feather Moment      | in. - lb | 4300    | 1520    | 990           | 2640    | 341       | 11   | 460           | 2430 | 12        | 69   |
| Fixed Hub Flap @ Sta 18   | in. - lb | 12,800  | 3200    | 25,700        | 16,700  | 87        | 72   | 13,000        | 9000 | 81        | 144  |
| Fixed Hub Chord @ Sta 18  | in. - lb | 7700    | 53,200  | 65,900        | 105,500 | 61        | 71   | 31,400        | 9900 | 1         | 38   |
| Blade Flap @ Sta 1305     | in. - lb | 40,400  | 10,500  | 9200          | 5000    | 260       | 323  | 3900          | 2900 | - 4       | 63   |
| Blade Flap @ Sta 205      | in. - lb | 28,800  | 7200    | 3400          | 4300    | 270       | 121  | 4300          | 2500 | 81        | 166  |
| Blade Flap @ Sta 235      | in. - lb | 34,500  | 700     | 1200          | 1950    | 63        | 99   | 7200          | 1700 | 82        | 178  |
| Blade Flap @ Sta 270      | in. - lb | 23,400  | 3400    | 4400          | 1060    | 82        | 24   | 6600          | 600  | 81        | 20   |
| Blade Chord @ Sta 103     | in. - lb | 121,000 | 210,500 | 39,800        | 50,500  | 67        | 77   | 16,800        | 6000 | 1         | 34   |
| Blade Chord @ Sta 235     | in. - lb | 18,200  | -27,000 | 6200          | 7000    | 58        | 72   | 4400          | 1140 | - 3       | 35   |
| Blade Torsion @ Sta 131.5 | in. - lb | 6910    | 500     | 1916          | 2700    | 55        | 36   | 600           | 1400 | 11        | 69   |
|                           |          |         |         |               |         |           |      |               |      |           |      |
|                           |          |         |         |               |         |           |      |               |      |           |      |



# AH-56A CORRELATION DATA CASE 31

AIRSPED = 123 KEAS; PRESSURE ALTITUDE = 3800 FT; AMBIENT TEMPERATURE = 73 °F

ROTOR LIFT = 16,300 LB; SHAFT MOMENT = 71,500 IN-LB FLAP UP AT 91 DEG

LOAD FACTOR = 1.11 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 8.4 DEG, TEST = 4.9 DEG

| PARAMETER                 | UNITS    | STEADY  |         | I-P MAGNITUDE |         | I-P PHASE |      | 2-P MAGNITUDE |        | 2-P PHASE |      |
|---------------------------|----------|---------|---------|---------------|---------|-----------|------|---------------|--------|-----------|------|
|                           |          | REXOR   | TEST    | REXOR         | TEST    | REXOR     | TEST | REXOR         | TEST   | REXOR     | TEST |
| Blade Feather Angle       | deg      | 7.4     | 7.0     | 4.3           | 5.5     | 289       | 291  | -             | -      | -         | -    |
| Blade Feather Moment      | in. - lb | 4380    | 2400    | 1650          | 2420    | 47        | 30   | 500           | 2400   | 2         | 71   |
| Fixed Hub Flap @ Sta 18   | in. - lb | 23,300  | 11,000  | 25,600        | 16,300  | 90        | 72   | 14,100        | 9000   | 80        | 148  |
| Fixed Hub Chord @ Sta 18  | in. - lb | 10,000  | 49,000  | 51,000        | 102,500 | 42        | 66   | 42,800        | 10,500 | 2         | 34   |
| Blade Flap @ Sta 130.5    | in. - lb | 41,600  | 11,500  | 9600          | 5100    | 262       | 324  | 4500          | 3100   | 1         | 65   |
| Blade Flap @ Sta 205      | in. - lb | 30,400  | 7100    | 4400          | 4600    | 268       | 123  | 5200          | 2800   | 79        | 166  |
| Blade Flap @ Sta 235      | in. - lb | 36,900  | 165     | 300           | 2600    | 9         | 101  | 8400          | 1700   | 81        | 177  |
| Blade Flap @ Sta 270      | in. - lb | 25,500  | 1900    | 3600          | 1150    | 84        | 21   | 7500          | 680    | 81        | 5    |
| Blade Chord @ Sta 103     | in. - lb | 149,000 | 208,000 | 31,900        | 49,000  | 53        | 71   | 22,800        | 6100   | 1         | 28   |
| Blade Chord @ Sta 235     | in. - lb | 16,000  | 26,500  | 5100          | 6900    | 37        | 69   | 6000          | 1300   | 3         | 29   |
| Blade Torsion @ Sta 131.5 | in. - lb | 7390    | 500     | 2550          | 2700    | 58        | 39   | 920           | 1400   | 2         | 73   |
|                           |          |         |         |               |         |           |      |               |        |           |      |
|                           |          |         |         |               |         |           |      |               |        |           |      |

# AH-56A CORRELATION DATA CASE 32

AIR SPEED = 123 KEAS; PRESSURE ALTITUDE = 3610 FT; AMBIENT TEMPERATURE = 73°F

ROTOR LIFT = 18,400 LB; SHAFT MOMENT = 71,100 IN-LB FLAP UP AT 103 DEG

LOAD FACTOR = 1.24 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 10.3 DEG, TEST = 6.1 DEG

| PARAMETER                 | UNITS    | STEADY   |         | I-P MAGNITUDE |         | I-P PHASE |      | 2-P MAGNITUDE |        | 2-P PHASE |      |
|---------------------------|----------|----------|---------|---------------|---------|-----------|------|---------------|--------|-----------|------|
|                           |          | REXOR    | TEST    | REXOR         | TEST    | REXOR     | TEST | REXOR         | TEST   | REXOR     | TEST |
| Blade Feather Angle       | deg      | 7.6      | 7.1     | 4.6           | 5.6     | 289       | 297  | -             | -      | -         | -    |
| Blade Feather Moment      | in. - lb | 4600     | 2980    | 3400          | 2860    | 70        | 45   | 786           | 2110   | 1         | 69   |
| Fixed Hub Flap @ Sta 18   | in. - lb | 35,400   | 21,000  | 26,600        | 16,000  | 98        | 80   | 14,900        | 9100   | 80        | 148  |
| Fixed Hub Chord @ Sta 18  | in. - lb | 4400     | 49,200  | 46,600        | 103,600 | 12        | 56   | 52,000        | 10,800 | 0         | 37   |
| Blade Flap @ Sta 130.5    | in. - lb | 43,200   | 11,600  | 9600          | 5450    | 264       | 326  | 5700          | 2900   | 3         | 64   |
| Blade Flap @ Sta 205      | in. - lb | - 32,700 | - 6200  | 5300          | 5000    | 271       | 118  | 6200          | 2600   | 78        | 168  |
| Blade Flap @ Sta 235      | in. - lb | - 40,100 | 600     | 1000          | 3100    | 297       | 95   | 9700          | 1700   | 79        | 176  |
| Blade Flap @ Sta 270      | in. - lb | - 28,000 | 2900    | 3000          | 1500    | 81        | 43   | 8700          | 700    | 80        | 23   |
| Blade Chord @ Sta 103     | in. - lb | 149,000  | 201,300 | 27,700        | 51,500  | 30        | 65   | 27,700        | 6400   | 1         | 26   |
| Blade Chord @ Sta 235     | in. - lb | - 15,700 | -27,500 | 5200          | 7200    | 9         | 61   | 7500          | 1200   | 6         | 29   |
| Blade Torsion @ Sta 131.5 | in. - lb | - 8300   | 1580    | 3500          | 1660    | 61        | 41   | 1330          | 900    | 1         | 66   |
|                           |          |          |         |               |         |           |      |               |        |           |      |
|                           |          |          |         |               |         |           |      |               |        |           |      |

## 36/

3052

DEC 1

DEC

[illegible]

AIR SPEED = 173 KEAS; PRESSURE ALTITUDE = 3490 FT; AMBIENT TEMPERATURE = 76 °F  
 ROTOR LIFT = 9600 LB; SHAFT MOMENT = 108,600 IN-LB FLAP UP AT 122 DEG  
 LOAD FACTOR = 1.24 g's; FUSELAGE ANGLE OF ATTACK; REXOR = -2.1 DEG, TEST = -0.2

287

AIR SPEED = 172 KEAS; PRESSURE ALTITUDE = 3390 FT; AMBIENT TEMPERATURE = 76 °F  
 ROTOR LIFT = 13,100 LB; SHAFT MOMENT = 121,800 IN-LB FLAP UP AT DEG  
 LOAD FACTOR = 1.56 g's; FUSELAGE ANGLE OF ATTACK; REXOR = -0.7 DEG, TEST = 1.8

288

# AH-56A CORRELATION DATA CASE 39

AIR SPEED = 154 KEAS; PRESSURE ALTITUDE = 3690 FT; AMBIENT TEMPERATURE = 77 °F

ROTOR LIFT = 12,200 LB; SHAFT MOMENT = 119,300 IN-LB FLAP UP AT 121 DEG

LOAD FACTOR = 1.36 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 4.2 DEG, TEST = 7.8 DEG

| PARAMETER                 | UNITS  | STEADY  |         | I-P MAGNITUDE |         | I-P PHASE |      | 2-P MAGNITUDE |        | 2-P PHASE |      |
|---------------------------|--------|---------|---------|---------------|---------|-----------|------|---------------|--------|-----------|------|
|                           |        | REXOR   | TEST    | REXOR         | TEST    | REXOR     | TEST | REXOR         | TEST   | REXOR     | TEST |
| Blade Feather Angle       | deg    | 6.3     | 6.0     | 2.3           | 4.4     | 290       | 300  | -             | -      | -         | -    |
| Blade Feather Moment      | in.-lb | 2400    | 2280    | 1180          | 3350    | 218       | 26   | 1030          | 3900   | 7         | 65   |
| Fixed Hub Flap @ Sta 18   | in.-lb | - 9700  | -10,250 | 40,900        | 26,200  | 116       | 106  | 15,700        | 18,500 | 82        | 142  |
| Fixed Hub Chord @ Sta 18  | in.-lb | 43,900  | 39,000  | 67,400        | 108,000 | 76        | 88   | 15,700        | 10,500 | - 4       | 70   |
| Blade Flap @ Sta 130.5    | in.-lb | 36,700  | 9200    | 8600          | 5500    | 246       | 323  | 4800          | 5000   | - 3       | 54   |
| Blade Flap @ Sta 205      | in.-lb | -26,100 | - 7300  | 6900          | 5800    | 275       | 119  | 2900          | 2400   | 72        | 147  |
| Blade Flap @ Sta 235      | in.-lb | -29,600 | - 2100  | 3400          | 3100    | 299       | 102  | 5700          | 140    | 77        | 12   |
| Blade Flap @ Sta 270      | in.-lb | -18,700 | 2250    | 2400          | 1300    | 43        | 35   | 5600          | 600    | 79        | 40   |
| Blade Chord @ Sta 103     | in.-lb | 147,000 | 200,000 | 39,200        | 54,000  | 77        | 95   | 8600          | 3600   | - 5       | 70   |
| Blade Chord @ Sta 174     | in.-lb | 21,600  | 18,300  | 19,500        | 27,800  | 76        | 98   | 5100          | 1300   | - 7       | 67   |
| Blade Chord @ Sta 235     | in.-lb | -14,200 | -27,000 | 6600          | 7800    | 75        | 98   | 2600          | 1500   | - 8       | 67   |
| Blade Torsion @ Sta 131.5 | in.-lb | - 5700  | 700     | 790           | 3400    | 40        | 47   | 440           | 1700   | 14        | 70   |

# AH-56A CORRELATION DATA CASE 40

AIR SPEED = 152.5 KEAS; PRESSURE ALTITUDE = 3380 FT; AMBIENT TEMPERATURE = 78°F

ROTOR LIFT = 17,600 LB; SHAFT MOMENT = 159,300 IN-LB FLAP UP AT 137 DEG

LOAD FACTOR = 1.77 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 7.7 DEG, TEST = 5.0 DEG

| PARAMETER                 | UNITS  | STEADY  |         | I-P MAGNITUDE |        | I-P PHASE |      | 2-P MAGNITUDE |        | 2-P PHASE |      |
|---------------------------|--------|---------|---------|---------------|--------|-----------|------|---------------|--------|-----------|------|
|                           |        | REXOR   | TEST    | REXOR         | TEST   | REXOR     | TEST | REXOR         | TEST   | REXOR     | TEST |
| Blade Feather Angle       | deg    | 6.8     | 6.3     | 3.1           | 4.8    | 287       | 309  | -             | -      | -         | -    |
| Blade Feather Moment      | in.-lb | 4030    | 6100    | 3320          | 2920   | 101       | 46   | 1120          | 4150   | 10        | 70   |
| Fixed Hub Flap @ Sta 18   | in.-lb | 21,700  | 14,200  | 53,800        | 32,600 | 129       | 131  | 19,500        | 20,900 | 81        | 144  |
| Fixed Hub Chord @ Sta 18  | in.-lb | 27,600  | 28,700  | 23,600        | 99,250 | 35        | 63   | 46,900        | 11,300 | 10        | 73   |
| Blade Flap @ Sta 130.5    | in.-lb | 41,200  | 10,600  | 9300          | 6500   | 246       | 326  | 6900          | 4930   | 5         | 56   |
| Blade Flap @ Sta 205      | in.-lb | -31,700 | 5800    | 8800          | 7300   | 280       | 123  | 6200          | 2200   | 71        | 148  |
| Blade Flap @ Sta 235      | in.-lb | -37,800 | 130     | 5400          | 4600   | 300       | 100  | 10,000        | 175    | 75        | 166  |
| Blade Flap @ Sta 270      | in.-lb | -25,700 | 4400    | 2600          | 2400   | 16        | 65   | 9000          | 1030   | 76        | 51   |
| Blade Chord @ Sta 103     | in.-lb | 151,000 | 190,500 | 18,500        | 47,400 | 48        | 74   | 25,500        | 4350   | 11        | 70   |
| Blade Chord @ Sta 174     | in.-lb | 20,600  | 15,600  | 9900          | 24,200 | 50        | 83   | 14,800        | 2000   | 14        | 55   |
| Blade Chord @ Sta 235     | in.-lb | -13,900 | 28,700  | 2700          | 6200   | 33        | 70   | 7300          | 670    | 4         | 66   |
| Blade Torsion @ Sta 131.5 | in.-lb | -7490   | 400     | 2590          | 4200   | 51        | 67   | 1100          | 2400   | 4         | 65   |
|                           |        |         |         |               |        |           |      |               |        |           |      |



# XH-51A CORRELATION DATA CASE 41

AIRSPED = 168 KEAS; PRESSURE ALTITUDE = 4600 FT; AMBIENT TEMPERATURE = 65°F

ROTOR LIFT = 1050 LB; SHAFT MOMENT = 19,100 IN-LB FLAP UP AT 57 DEG

LOAD FACTOR = 1.03 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 2.2 DEG, TEST \* DEG

| PARAMETER               | UNITS  | STEADY  |         | I-P MAGNITUDE |        | I-P PHASE |      | 2-P MAGNITUDE |      | 2-P PHASE |      |
|-------------------------|--------|---------|---------|---------------|--------|-----------|------|---------------|------|-----------|------|
|                         |        | REXOR   | TEST    | REXOR         | TEST   | REXOR     | TEST | REXOR         | TEST | REXOR     | TEST |
| Blade Feather Angle     | deg    | 3.0     | 2.8     | 1.9           | 1.9    | 334       | 321  | -             | -    | -         | -    |
| Blade Feather Moment    | in.-lb | -1480   | -465    | 260           | 400    | 329       | 298  | 120           | 60   | 77        | 109  |
| Fixed Hub Flap @ Sta 6  | in.-lb | -38,900 | -25,700 | 5400          | 4900   | 54        | 57   | 1700          | 7400 | 119       | 142  |
| Fixed Hub Chord @ Sta 6 | in.-lb | 9400    | 16,900  | 15,600        | 17,700 | 105       | 92   | 1100          | 5500 | 10        | 58   |
| Blade Flap @ Sta 115    | in.-lb | 250     | -430    | 1220          | 1350   | 328       | 327  | 440           | 800  | 37        | 52   |
| Blade Flap @ Sta 157    | in.-lb | 530     | -610    | 570           | 900    | 34        | 311  | 320           | 400  | 110       | 41   |
| Blade Chord @ Sta 45    | in.-lb | 18,600  | 18,000  | 10,200        | 12,600 | 101       | 93   | 700           | 1300 | 1         | 76   |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
| *Not Available          |        |         |         |               |        |           |      |               |      |           |      |



## 24

65 of

92 DEG

**\* DEG**

**\*Not Available**

XH-51A CORRELATION DATA CASE 43

AIR SPEED = 170 KEAS; PRESSURE ALTITUDE = 4100 FT; AMBIENT TEMPERATURE = 67 °F

ROTOR LIFT = 2320 LB; SHAFT MOMENT = 4800 IN-LB FLAP UP AT 150 DEG

LOAD FACTOR = 1.49 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 3.3 DEG, TEST \* DEG

| PARAMETER               | UNITS  | STEADY  |         | I-P MAGNITUDE |        | I-P PHASE |      | 2-P MAGNITUDE |      | 2-P PHASE |      |
|-------------------------|--------|---------|---------|---------------|--------|-----------|------|---------------|------|-----------|------|
|                         |        | REXOR   | TEST    | REXOR         | TEST   | REXOR     | TEST | REXOR         | TEST | REXOR     | TEST |
| Blade Feather Angle     | deg    | 3.3     | 3.1     | 1.3           | 2.0    | 334       | 303  | -             | -    | -         | -    |
| Blade Feather Moment    | in.-lb | -1390   | -270    | 80            | 390    | 241       | 274  | 30            | 50   | 76        | 117  |
| Fixed Hub Flap @ Sta 6  | in.-lb | -37,800 | -21,000 | 1200          | 1300   | 109       | 150  | 1800          | 7900 | 115       | 134  |
| Fixed Hub Chord @ Sta 6 | in.-lb | 8300    | 11,900  | 15,200        | 21,400 | 84        | 76   | 1400          | 7300 | 8         | 57   |
| Blade Flap @ Sta 115    | in.-lb | 540     | -450    | 1600          | 1550   | 290       | 321  | 580           | 900  | 41        | 53   |
| Blade Flap @ Sta 157    | in.-lb | 290     | -850    | 270           | 1150   | 301       | 304  | 470           | 470  | 96        | 44   |
| Blade Chord @ Sta 45    | in.-lb | 16,600  | 15,700  | 10,400        | 14,300 | 82        | 83   | 860           | 2400 | -3        | 68   |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
| *Not Available          |        |         |         |               |        |           |      |               |      |           |      |

# XH-51A CORRELATION DATA CASE 44

AIRSPED = 173 KEAS; PRESSURE ALTITUDE = 3540 FT; AMBIENT TEMPERATURE = 70°F

ROTOR LIFT = 2720 LB; SHAFT MOMENT = 7470 IN-LB FLAP UP AT 197 DEG

LOAD FACTOR = 1.69 g's; FUSELAGE ANGLE OF ATTACK; REXOR = 3.6 DEG, TEST \*DEG

| PARAMETER               | UNITS  | STEADY  |         | I-P MAGNITUDE |        | I-P PHASE |      | 2-P MAGNITUDE |      | 2-P PHASE |      |
|-------------------------|--------|---------|---------|---------------|--------|-----------|------|---------------|------|-----------|------|
|                         |        | REXOR   | TEST    | REXOR         | TEST   | REXOR     | TEST | REXOR         | TEST | REXOR     | TEST |
| Blade Feather Angle     | deg    | 3.2     | 3.1     | 1.0           | 2.4    | 336       | 292  | -             | -    | -         | -    |
| Blade Feather Moment    | in.-lb | -1370   | --190   | 150           | 350    | 213       | 270  | 20            | 80   | 92        | 147  |
| Fixed Hub Flap @ Sta 6  | in.-lb | -38,000 | -17,500 | 1800          | 1900   | 201       | 197  | 1900          | 8300 | 115       | 133  |
| Fixed Hub Chord @ Sta 6 | in.-lb | 8000    | 10,500  | 15,500        | 25,600 | 74        | 67   | 2000          | 8500 | 10        | 52   |
| Blade Flap @ Sta 115    | in.-lb | 630     | -400    | 1960          | 1750   | 280       | 317  | 610           | 900  | 44        | 48   |
| Blade Flap @ Sta 157    | in.-lb | 210     | -850    | 500           | 1300   | 265       | 301  | 560           | 460  | 96        | 37   |
| Blade Chord @ Sta 45    | in.-lb | 15,000  | 14,900  | 10,800        | 17,000 | 74        | 75   | 1300          | 3400 | 0         | 67   |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
|                         |        |         |         |               |        |           |      |               |      |           |      |
| *Not Available          |        |         |         |               |        |           |      |               |      |           |      |

### APPENDIX III

#### REXOR INPUT DATA

This appendix contains a listing of input data for the REXOR program for both the AH-56A and XH-51A compound helicopter configurations, together with a definition of each input quantity. The REXOR input format is comprised of 3000 data locations identified as relative addresses (RA's). Using this format, any data item or series of data items may be changed for expediting stacking of multiple-case data. The listing provided is indexed by relative address to guarantee that all input data are provided.

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>1 | DESCRIPTION                   |                       |
|------------------------------|-----------|-------------------------------|-----------------------|
| 1 ***** (15)                 |           | TITLE CARD 1                  |                       |
| 2                            |           |                               |                       |
| 3                            |           |                               |                       |
| 4                            |           |                               |                       |
| 5                            |           |                               |                       |
| 6                            |           |                               |                       |
| 7                            |           |                               |                       |
| 8                            |           |                               |                       |
| 9                            |           |                               |                       |
| 10                           |           |                               |                       |
| 11                           |           |                               |                       |
| 12                           |           |                               |                       |
| 13                           |           |                               |                       |
| 14                           |           |                               |                       |
| 15                           |           |                               |                       |
| 16 ***** (15)                |           | TITLE CARD 2                  |                       |
| 17                           |           |                               |                       |
| 18                           |           |                               |                       |
| 19                           |           |                               |                       |
| 20                           |           |                               |                       |
| 21                           |           |                               |                       |
| 22                           |           |                               |                       |
| 23                           |           |                               |                       |
| 24                           |           |                               |                       |
| 25                           |           |                               |                       |
| 26                           |           |                               |                       |
| 27                           |           |                               |                       |
| 28                           |           |                               |                       |
| 29                           |           |                               |                       |
| 30                           |           |                               |                       |
| 31 XCSMAX                    |           | MAX LONG. STICK TRAVEL ,FT.   | 1.0000E 03 1.0000E 03 |
| 32 AZI                       |           | NO. OF POINTS/REV. IN TRIM    | 1.3000E 02 1.8000E 02 |
| 33 TRIMJ (3)                 |           | TRIM MOTOR ROLL MOMENT, FT-LB | 0.0 0.0               |

XH-51A

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GA= 25.7  
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64  
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D FL  
AP M  
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| REFUR DATA<br>R/A PRG.SYMBOL | PAGE<br>2 | DESCRIPTION   | AH-56A     | XH-51A     |
|------------------------------|-----------|---|------------|------------|
| 34                           |           | TRIM ROTOR PITCH MOMENT, FT-LB  | 0.0        | 0.0        |
| 35                           |           | TRIM ROTOR TORQUE MOMENT, FT-LB                                       | 0.0        | 0.0        |
| 36                           | TCUT      | MAX REVOLUTIONS TO TRIM   | 1.6000E 01 | 2.0000E 01 |
| 37                           | LE        | INITIAL ALTITUDE, FT, +=UP  | 0.0        | 0.0        |
| 38                           | RET       | SIDE SLIP ANGLE, RAD  | 0.0        | 0.0        |
| 39                           | *****     | STICK STABILIZER DISP. COEFF.<br>0=OFF, .NE.0=ON                      | 0.0        | 0.0        |
| 40                           | *****     | STICK STABILIZER RATE. COEFF.   | 0.0        | 0.0        |
| 41                           | XBDP      | DIST. BOBWIGHT FORWARD OF CG.<br>FT.                                  | 1.2800E 01 | 0.0        |
| 42                           | HAFDSP    | 1=HARD SWASH PLATE, KINEMATIC<br>LINKAGE ONLY, NO SP D.O.F.           | 0.0        | 0.0        |
| 43                           | ZPLT      | BLADE TIP PLUT FLAG INACTIVE  | 0.0        | 0.0        |
| 44                           | NSDATA    | BLADE SECTION AFFC FLAG<br>0=TABLE, 1=LINEAR                          | 0.0        | 0.0        |
| 45                           | CRSEF     | CONSTANT ROTOR SPEED FLAG<br>1=CONST. ROTOR SPEED                     | 0.0        | 1.0000E 00 |
| 46                           | TCNTR     | MASS MATRIX PRINT FLAG<br>0=OFF, 1=ON                                 | 0.0        | 1.0000E 00 |
| 47                           | IPJNCH    | PUNCH FLAG<br>0=OFF 1=ON  | 1.0000E 00 | 1.0000E 00 |
| 48                           | IPLOT     | PLOT FLAG, 0=NONE, 1=TRIM, 2=FLY<br>3=TRM AND FLY, 4=LIST, 5=SEC SPRD | 3.0000E 00 | 3.0000E 00 |

| REXOR DATA<br>R/A PRG-SYMBOL | PAGE<br>3 | DESCRIPTION                          | AH-56A      | XH-51A      |
|------------------------------|-----------|--------------------------------------|-------------|-------------|
| 49 IPRINT                    |           | EVERY POINT PRINT FLAG<br>0=OFF,1=ON | 0.0         | 0.0         |
| 50 CASE                      |           | CASE NO.                             | 7.5130E 03  | 5.6300E 02  |
| 51 NAZ                       |           | NO. OF POINTS/REV. IN FLY            | 1.8000E 02  | 1.8000E 02  |
| 52 N                         |           | MAIN ROTOR SPEED,RAD/SEC             | 2.5880E 01  | 3.6740E 01  |
| 53 BP                        |           | PROPELLER BLADE ANGLE,RAD            | 4.3920E-01  | 4.1181E-01  |
| 54 :1S                       |           | LATERAL CYCLIC,RAD                   | -1.3152E-02 | -2.7823E-02 |
| 55 31S                       |           | LONGITUDINAL CYCLIC,RAD              | 2.5955E-02  | 3.7001E-02  |
| 56 THO                       |           | COLLECTIVE,RAD                       | 1.4300E-01  | 7.0000E-02  |
| 57 THOTR                     |           | TAIL ROTOR COLLECTIVE,RAD            | 2.2956E-02  | 5.5050E-02  |
| 58 ALPHA                     |           | ANGLE OF ATTACK,RAD                  | 3.3300E-02  | 6.3041E-02  |
| 59 PHI                       |           | BANK ANGLE,RAD                       | -8.1390E-03 | -1.1973E-02 |
| 60 OPEN(2)                   |           | OPEN                                 | -7.5130E-01 | 0.0         |
| 61                           |           |                                      | 0.0         | 0.0         |
| 62 VT                        |           | TOTAL VELOCITY,FT/SEC                | 2.1500E 02  | 2.4800E 02  |
| 63 GAMMA                     |           | FLIGHT PATH ANGLE,RAD                | 0.0         | 0.0         |
| 64 GAMAI                     |           | NOT USED                             | -2.5440E 03 | 0.0         |
| 65 W1M2                      |           | VERTICAL DOWNWASH                    | 3.5000E 00  | 2.0127E 00  |
| 66 P1M2                      |           | POLL DOWNWASH                        | 2.1400E-02  | 4.0923E-03  |
| 67 Q1M2                      |           | PITCH DOWNWASH                       | -6.3900E-03 | 1.1603E-02  |

| PEXOR DATA<br>P/A PRG.SYMBOL | PAGE<br>4 | DESCRIPTION  | AH-56A      | XH-51A      |
|------------------------------|-----------|--|-------------|-------------|
| 68 KFKG                      |           | BOWWEIGHT FEEDBACK GAIN  | 0.0         | 0.0         |
| 69 GLGUN                     |           | FILTERED GYRO ROLL MOMENT OR<br>SP ROLL MOMENT, FT-LB              | 0.0         | -3.8400E 00 |
| 70 GMCON                     |           | FILTERED GYRO PITCH MOMENT OR<br>SP PITCH MOMENT, FT-LB            | 0.0         | 2.0031E 01  |
| 71 WIMRD                     |           | D/DT OF WIMP   | 0.0         | 0.0         |
| 72 PIMRL                     |           | D/DT OF PIMR   | 0.0         | 0.0         |
| 73 QIMRD                     |           | C/DT OF QIME   | 0.0         | 0.0         |
| 74 WIMRNI                    |           | NOT USED IN CURRENT PROGRAM<br>KEEP OPEN                           | 3.5000E 00  | 0.0         |
| 75 PIMPN1                    |           |  | 2.1486E-02  | 0.0         |
| 76 QIMRNI                    |           |  | -6.4000E-03 | 0.0         |
| 77 AITF                      |           | TAIL ROTGR LONG. FLAP ANGLE  | 0.0         | 2.3978E-02  |
| 78 WITR                      |           | TAIL ROTOR DOWNWASH  | 5.0000E 00  | 4.9343E 00  |
| 79 DNWFLG                    |           | DOWN WASH FLAG 0=CN  | 0.0         | 0.0         |
| 80 TAU                       |           | TRIM CONTROL TIME CONSTANT, SEC                                    | 5.0000E-02  | 6.0000E-02  |
| 81 R                         |           | ROTOR RADIUS = RA(513), FT   | 2.5700E 01  | 1.7500E 01  |
| 82 OB(3)                     |           | NAT. FREQ., RAD/SEC, WITH BLADE<br>DATA, (INFO. ONLY) SEE RA(1286) | 3.5640E 01  | 5.7030E 01  |
| 83                           |           |  | 2.8280E 01  | 4.0500E 01  |
| 84                           |           |  | 6.9670E 01  | 1.0070E 02  |
| 85 TH1                       |           | BLADE TWIST ANGLE, RAD   | -8.7270E-02 | -8.1050E-02 |



| REXOR DATA<br>R/A | PRG.SYMBOL | PAGE<br>5 | DESCRIPTION                                      | AM-56A     | XM-51A      |
|-------------------|------------|-----------|--|------------|-------------|
| 86                | SL         |           | LONGITUDINAL C.G. OFFSET,FT                      | 0.0        | 0.0         |
| 87                | QNEAR      |           | LATERAL C.G. OFFSET,FT                           | 0.0        | 0.0         |
| 88                | DY(2)      |           | NOT USED IN CURRENT PROGRAM                      | 5.6140F 03 | 0.0         |
| 89                |            |           | KEEP OPEN  | 5.3710E 04 | 0.0         |
| 90                | IPITCH     |           | PITCH DESSENSITIZER FLAG<br>0=OFF,1=ON           | 0.0        | 0.0         |
| 91                | FMASS      |           | FUSELAGE MASS,SLUGS                              | 4.7200E 02 | 1.3400E 02  |
| 92                | OPEN       |           | UPFN   | 1.0000E 04 | 0.0         |
| 93                | H          |           | ALTITUDE,FT                                      | 1.0000E 04 | 1.0000E 04  |
| 94                | KRD        |           | ROLL DAMPER GAIN                                 | 0.0        | 0.0         |
| 95                | HC         |           | VERT. DIST. HUB TO C.G.,FT                       | 5.7000E 00 | 0.0         |
| 96                | HF         |           | VEPT. DIST. HUB TO FUSLG. AXIS<br>,FT            | 5.4500E 00 | 2.7400E 00  |
| 97                | STR        |           | TAIL FIN BLOCKAGE FACTOR                         | 1.0000E 00 | 8.0000E-01  |
| 98                | SLTP       |           | AFT.DIST. TAIL MOTOR TO FUSE<br>AXIS,FT 98.5 FT. | 2.9900F 01 | 2.1800E 01  |
| 99                | SLP        |           | AFT.DIST. PROPELLER TO FUSE<br>AXIS,FT           | 3.1400E 01 | 0.0         |
| 100               | MP         |           | VERT DIST. PROPELLER TO FUSE<br>AXIS,FT          | 9.5000E-01 | -1.3300E 00 |
| 101               | SLHS       |           | AFT DIST. HORIZONTAL SURFACE<br>TO FUSE AXIS,FT  | 2.8200E 01 | 1.7500E 01  |

| REXOR DATA<br>P/A PRG-SYMBOL | PAGE<br>6 | DESCRIPTION  | AM-56A      | XH-51A      |
|------------------------------|-----------|--|-------------|-------------|
| 102 SIVS                     |           | AFT DIST. VERT. SURFACE TO<br>FUSE AXIS, FT            | 2.6700E 01  | 2.2200E 01  |
| 103 HVS                      |           | VERT DIST. VERT SURFACE TO<br>FUSE AXIS, FT            | -1.7200E 00 | -2.0000E-01 |
| 104 EDIT                     |           | NEW DATA DECK OPTION<br>0=DIFF, .NE.0=UN               | 0.0         | 0.0         |
| 105 IDAMP                    |           | ROLL DAMPER FLAG NOT USED IN<br>CURRENT PRG. KEEP OPEN | 0.0         | 0.0         |
| 106 ETAF                     |           | EQUIVALENT VELOCITY RATIO<br>AT TAIL                   | 9.0000E-01  | 8.6000E-01  |
| 107 QP3PT                    |           | TAIL BLOCKAGE FACTOR FOR PROP.                         | 1.0000E 00  | 1.0000E 00  |
| 108 QIP                      |           | PROP. INCIDENT ANGLE, RAD                              | 0.0         | 2.2700E-01  |
| 109 RHJ                      |           | AIR DENSITY, SLUG/FT <sup>3</sup>                      | 2.1700E-03  | 2.1300E-03  |
| 110 CORD                     |           | BLADE CHORD, FT  | 2.3300E 00  | 1.1240E 00  |
| 111 SMALLA                   |           | BLADE LIFT CURVE SLOPE                                 | 5.7000E 00  | 5.7000E 00  |
| 112 DELT0                    |           | BLADE DRAG AT ZERO LIFT                                | 8.0000E-03  | 8.0000E-03  |
| 113 DELT2                    |           | BLADE DRAG VARIATION WITH LIFT<br>SQUARED              | 3.6000E-01  | 3.6000E-01  |
| 114 FCF                      |           | FEATH. FRICTION  | 0.0         | 0.0         |
| 115 RLF                      |           | FEATH. STICTION BREAKPOINT                             | 0.0         | 0.0         |
| 116 FCG                      |           | GYRO OR SWASHPLATE FRICTION                            | 0.0         | 0.0         |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>7 | DESCRIPTION                              | AH-56A     | XH-51A     |
|------------------------------|-----------|--|------------|------------|
| 117 PLG                      |           | GYRO OR SWASHPLATE STICKION<br>REFPOINT  | 0.0        | 0.0        |
| 118 QJGYRO                   |           | GYRO OR SP. POLAR MOM. OF<br>INERTIA,    | 4.5300E 01 | 8.0400E 00 |
| 119 CHI                      |           | GYRO TO CONTROL PHASE ANGLE<br>(SWP.),FT | 6.2800E-01 | 4.1900E-01 |
| 120 TUP                      |           | AUTHORITY LIMITS ON LATERAL<br>STICK     | 3.3000E-02 | 0.0        |
| 121 QCGK                     |           | GYRO DAMPING CONSTANT,ROLL<br>(SWP.)     | 1.0570E 03 | 1.5000E 02 |
| 122 QCGD                     |           | GYRO DAMPING CONSTANT,PITCH<br>(SWP.)    | 1.0570E 03 | 1.5000E 02 |
| 123 QKXCS                    |           | SPRING CONSTANT, LONG. STICK             | 3.3300E 03 | 3.7000E 02 |
| 124 JKYCS                    |           | SPRING CONSTANT, LAT. STICK              | 6.3000E 03 | 7.3000E 02 |
| 125 BETAG                    |           | GYRO TO ROTOR CANT ANGLE<br>(SWP.),RAD   | 5.7600E-01 | 7.8500E-01 |
| 126 QK GK                    |           | GYRO SPRING CONSTANT, ROLL<br>(SWP.)     | 4.1000E 03 | 2.5000E 02 |
| 127 QKGD                     |           | GYRO SPRING CONSTANT, PITCH<br>(SWP.)    | 4.1000E 03 | 2.5000E 02 |
| 128 HUBL(5)                  |           | DIST TO INBRD.BRNG.,FT                   | 2.9170E 00 | 1.2080E 00 |
| 129                          |           | DIST.BETWEEN FEATH.BRNGS.,FT             | 2.0830E 00 | 6.6670E-01 |
| 130                          |           | DIST.TO AMCS FDBK.MOUNT,FT               | 0.0        | 0.0        |
| 131                          |           | NOT USED                                 | 0.0        | 0.0        |
| 132                          |           |  | 0.0        | 0.0        |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>8 | DESCRIPTION   | AM-56A      | XH-51A      |
|------------------------------|-----------|---|-------------|-------------|
| 133 NGJRF                    |           | GROUND RUN OR FREE FLY FLAG<br>0=FREE FLY,1=FIXED SHAFT | 0.0         | 0.0         |
| 134 CYCFLG                   |           | FLY PLOT SCALE FLAG,RA(298)<br>0=SEC/IN,1=CYCLES/IN     | 0.0         | 0.0         |
| 135 DEJCA                    |           | DE/D(ALPHA) AT TAIL FROM WING<br>.365                   | 4.3000E-01  | 6.5000E-01  |
| 136 E                        |           | PITCH HORN LENGTH,FT                                    | 1.3300E 00  | 5.5000E-01  |
| 137 QKGZ1                    |           | FIRST VERT. GYRO SPKING CONST.<br>(SWP.)                | 6.7200E 02  | 1.6000E 05  |
| 138 JCGZ                     |           | GYRO VERT. DAMPING CONSTANT<br>(SWP.)                   | 3.6000E 02  | 1.0000E 03  |
| 139 GMASS                    |           | GYFU MASS (SWP.),SLUGS                                  | 8.7000E 00  | 2.0000E 00  |
| 140 QKGZ2                    |           | SECOND VERT. GYRO SPRING CONST<br>(SWP.)                | 1.6800E 05  | 1.6000E 05  |
| 141 ZG1                      |           | GYFO VERT. SPRING BREAKPOINT<br>(SWP.)                  | 4.1600E-03  | 1.0000E 00  |
| 142 CORAF                    |           | TRIM OPTION   | 1.0000E 00  | 1.0000E 00  |
| 143 TURNLF                   |           | TURN LOAD FACTOR,G                                      | 1.0000E 00  | 1.0000E 00  |
| 144 TURN5N                   |           | FLAG FOR TURN LEFT OR RIGHT<br>+=RIGHT                  | -1.0000E 00 | -1.0000E 00 |
| 145 C111                     |           | INPLANE TO FEATHER COUPLING                             | 7.0000E-01  | 5.8980E-01  |
| 146 C1F1                     |           | FIRST FLAP TO FEATHER COUPLING                          | 5.5000E-02  | -2.6970E-01 |
| 147 C1F2                     |           | C1F1 WITH FEATHER ANGLE                                 | -6.3800E-01 | 0.0         |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>9 | DESCRIPTION                        | AM-56A      | XH-51A      |
|------------------------------|-----------|------------------------------------|-------------|-------------|
| 148 C2F1                     |           | SECOND FLAP TO FEATHER COUPLING    | -1.8500E-01 | -3.1060E-01 |
| 149 C2F2                     |           | C2F1 WITH FEATHER ANGLE            | -6.3800E-01 | 0.0         |
| 150 NMP                      |           | NO. OF POINTS FOR PILOT TABLES     | 1.9000E 01  | 1.6000E 01  |
| 151 PT(20)                   |           | PILOT TIME TABLE SEC               |             |             |
| 152                          |           |                                    | 0.0         | 0.0         |
| 153                          |           |                                    | 3.2000E-01  | 1.2500E-01  |
| 154                          |           |                                    | 3.8000E-01  | 2.5000E-01  |
| 155                          |           |                                    | 4.8000E-01  | 3.7500E-01  |
| 156                          |           |                                    | 5.5000E-01  | 6.2500E-01  |
| 157                          |           |                                    | 6.0000E-01  | 8.7500E-01  |
| 158                          |           |                                    | 8.0000E-01  | 1.6250E 00  |
| 159                          |           |                                    | 1.0000E 00  | 2.5000E 00  |
| 160                          |           |                                    | 1.2000E 00  | 2.6250E 00  |
| 161                          |           |                                    | 1.4000E 00  | 2.7500E 00  |
| 162                          |           |                                    | 1.6000E 00  | 2.8250E 00  |
| 163                          |           |                                    | 1.8000E 00  | 3.1250E 00  |
| 164                          |           |                                    | 2.0000E 00  | 3.2500E 00  |
| 165                          |           |                                    | 2.2000E 00  | 3.5000E 00  |
| 166                          |           |                                    | 2.3000E 00  | 3.8750E 00  |
| 167                          |           |                                    | 2.4000E 00  | 4.2500E 00  |
| 168                          |           |                                    | 2.5000E 00  | 0.0         |
| 169                          |           |                                    | 2.6000E 00  | 0.0         |
| 170                          |           |                                    | 2.7000E 00  | 0.0         |
| 171 PXC S(20)                |           | PILOT LONG. STICK DISPL. TABL., FT | 0.0         | 0.0         |
| 172                          |           |                                    | 0.0         | 8.0000E-03  |
| 173                          |           |                                    | 0.0         | 2.9000E-02  |
| 174                          |           |                                    | 1.2500E-02  | 5.8000E-02  |
| 175                          |           |                                    | 1.6700E-02  | 1.3800E-01  |
| 176                          |           |                                    | 1.6700E-02  | 1.5000E-01  |
| 177                          |           |                                    | 1.4200E-02  | 1.2500E-01  |
| 178                          |           |                                    | 1.5000E-02  | 1.2100E-01  |
| 179                          |           |                                    | 1.4200E-02  | 1.1700E-01  |
| 180                          |           |                                    | 1.4200E-02  | 8.3000E-02  |

REXOK DATA PAGE 10  
P/A PRG.SYMBOL DESCRIPTION

|              | AM-56A      | XT-51A      |
|--------------|-------------|-------------|
| 181          | 1.6700E-02  | 4.2000E-02  |
| 182          | 1.6700E-02  | -8.0000E-03 |
| 183          | 2.0800E-02  | -1.7000E-02 |
| 184          | 2.0800E-02  | -1.7000E-02 |
| 185          | 2.0800E-02  | 0.0         |
| 186          | 2.0800E-02  | 1.3000E-02  |
| 187          | 2.0800E-02  | 0.0         |
| 188          | 2.5000E-02  | 0.0         |
| 189          | 2.5000E-02  | 0.0         |
| 190          | 0.0         | 0.0         |
| 191 PYCS(20) | 0.0         | 0.0         |
| 192          | 0.0         | 0.0         |
| 193          | -1.6700E-02 | 0.0         |
| 194          | -6.7000E-02 | 0.0         |
| 195          | -9.6000E-02 | 0.0         |
| 196          | -9.8000E-02 | 4.0000E-03  |
| 197          | -9.6000E-02 | 1.6000E-02  |
| 198          | -9.2000E-02 | 4.0000E-03  |
| 199          | -8.8000E-02 | -1.0000E-03 |
| 200          | -8.3000E-02 | -5.0000E-03 |
| 201          | -7.9000E-02 | -1.7000E-02 |
| 202          | -7.5000E-02 | -1.7000E-02 |
| 203          | -7.1000E-02 | -1.7000E-02 |
| 204          | -6.3000E-02 | 0.0         |
| 205          | -5.4000E-02 | 0.0         |
| 206          | -2.8000E-02 | 0.0         |
| 207          | -4.0000E-03 | 0.0         |
| 208          | 1.2000E-02  | 0.0         |
| 209          | 2.5000E-02  | 0.0         |
| 210          | 0.0         | 0.0         |
| 211 PTHO(20) | 0.0         | 0.0         |
| 212          | 0.0         | 0.0         |
| 213          | 0.0         | 0.0         |
| 214          | 0.0         | 0.0         |
| 215          | 0.0         | 0.0         |

| REPOR. DATA     | PAGE                           | 11 |        |        |
|-----------------|--------------------------------|----|--------|--------|
| R/A PKG. SYMBOL | DESCRIPTION                    |    |        |        |
| 216             |                                |    | AH-56A | XH-51A |
| 217             |                                |    | 0.0    | 0.0    |
| 218             |                                |    | 0.0    | 0.0    |
| 219             |                                |    | 0.0    | 0.0    |
| 220             |                                |    | 0.0    | 0.0    |
| 221             |                                |    | 0.0    | 0.0    |
| 222             |                                |    | 0.0    | 0.0    |
| 223             |                                |    | 0.0    | 0.0    |
| 224             |                                |    | 0.0    | 0.0    |
| 225             |                                |    | 0.0    | 0.0    |
| 226             |                                |    | 0.0    | 0.0    |
| 227             |                                |    | 0.0    | 0.0    |
| 228             |                                |    | 0.0    | 0.0    |
| 229             |                                |    | 0.0    | 0.0    |
| 230             |                                |    | 0.0    | 0.0    |
| 231             | PILOT TAIL RTP.COLCTV.TBL.,RAD |    | 0.0    | 0.0    |
| 232             |                                |    | 0.0    | 0.0    |
| 233             |                                |    | 0.0    | 0.0    |
| 234             |                                |    | 0.0    | 0.0    |
| 235             |                                |    | 0.0    | 0.0    |
| 236             |                                |    | 0.0    | 0.0    |
| 237             |                                |    | 0.0    | 0.0    |
| 238             |                                |    | 0.0    | 0.0    |
| 239             |                                |    | 0.0    | 0.0    |
| 240             |                                |    | 0.0    | 0.0    |
| 241             |                                |    | 0.0    | 0.0    |
| 242             |                                |    | 0.0    | 0.0    |
| 243             |                                |    | 0.0    | 0.0    |
| 244             |                                |    | 0.0    | 0.0    |
| 245             |                                |    | 0.0    | 0.0    |
| 246             |                                |    | 0.0    | 0.0    |
| 247             |                                |    | 0.0    | 0.0    |
| 248             |                                |    | 0.0    | 0.0    |
| 249             |                                |    | 0.0    | 0.0    |
| 250             |                                |    | 0.0    | 0.0    |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>12 | DESCRIPTION                   | AH-56A      | XH-51A      |
|------------------------------|------------|-------------------------------|-------------|-------------|
| 251 PBP(20)                  |            | PILOT PROP.BLD.ANGLE.TBL.,RAD |             |             |
| 252                          |            |                               | 0.0         | 0.0         |
| 253                          |            |                               | 0.0         | 0.0         |
| 254                          |            |                               | 0.0         | 0.0         |
| 255                          |            |                               | 0.0         | 0.0         |
| 256                          |            |                               | 0.0         | 0.0         |
| 257                          |            |                               | 0.0         | 0.0         |
| 258                          |            |                               | 0.0         | 0.0         |
| 259                          |            |                               | 0.0         | 0.0         |
| 260                          |            |                               | 0.0         | 0.0         |
| 261                          |            |                               | 0.0         | 0.0         |
| 262                          |            |                               | 0.0         | 0.0         |
| 263                          |            |                               | 0.0         | 0.0         |
| 264                          |            |                               | 0.0         | 0.0         |
| 265                          |            |                               | 0.0         | 0.0         |
| 266                          |            |                               | 0.0         | 0.0         |
| 267                          |            |                               | 0.0         | 0.0         |
| 268                          |            |                               | 0.0         | 0.0         |
| 269                          |            |                               | 0.0         | 0.0         |
| 270                          |            |                               | 0.0         | 0.0         |
| 271 DDF0                     |            | GEAR RATIO - STATIC (SMP.)    | 7.2000E-01  | 7.8000E-01  |
| 272 DDF1                     |            | GEAR RATIO (SMP.)             | -2.0000E-01 | -3.0000E-01 |
| 273 FKSPT                    |            | SHAFT BENDING DELTA-3 COEFF.  | 6.0000E-07  | 0.0         |
| 274 DELQMR                   |            | TRIM VARIABLE                 | 0.0         | 0.0         |
| 275 FBL11(2,2)               |            | FEATH.REAR.DISPL.,INPLANE     | 1.0700E-02  | 5.4160E-03  |
| 276                          |            |                               | -6.1790E-03 | -4.3460E-03 |
| 277                          |            |                               | 6.1650E-02  | 2.1160E-02  |
| 278                          |            |                               | -2.9650E-02 | -9.1240E-03 |
| 279 FRL1F(2,2)               |            | FEATH.BEAR.DISPL.,1ST.FLAP    | 2.2580E-04  | 4.7180E-05  |
| 280                          |            |                               | 2.8410E-02  | 3.0720E-02  |
| 281                          |            |                               | 1.2830E-03  | 1.8220E-04  |



| REFOR DATA | PAGE        | DESCRIPTION                    | AM-56A      | XM-51A      |
|------------|-------------|--------------------------------|-------------|-------------|
| 282        |             |                                | 1.0350E-01  | 5.6270E-02  |
| 283        | FBI 2F(2,2) | FEATH.BEAP.DISPL.,2ND.FLAP     | -3.4510E-03 | -2.2690E-04 |
| 284        |             |                                | -8.0910E-02 | -8.6160E-02 |
| 285        |             |                                | -1.9700E-02 | -8.8680E-04 |
| 286        |             |                                | -2.4240E-01 | -1.5560E-01 |
| 287        | TC(5)       | DWNWSH TIME CONST. IN TRIM     | 1.0000E-01  | 1.0000E-01  |
| 288        |             | DWNWSH TIME CONST. IN FLY      | 5.0000E-02  | 5.0000E-02  |
| 289        |             | NOT USED                       | 1.0000E-01  | 1.0000E-01  |
| 290        |             | SHAFT BENDING TIME CONSTANT    | 1.0000E-02  | 1.0000E-02  |
| 291        |             | NOT USED                       | 1.0000E-01  | 0.0         |
| 292        | TCX         | PILOT LONG. ACTUATOR TIME CON. | 2.5000E-02  | 2.5000E-02  |
|            |             | ,SEC                           |             |             |
| 293        | TCY         | PILOT LAT. ACTUATOR TIME CON.  | 2.5000E-02  | 2.5000E-02  |
|            |             | ,SEC                           |             |             |
| 294        | TXS         | FEATHER SPRING                 | 7.1600E 02  | 0.0         |
| 295        | PRI         | POLL RATE INPUT FOR TRIM       | 0.0         | 0.0         |
|            |             | RAD/SEC                        |             |             |
| 296        | QRI         | PITCH RATE INPUT FOR TRIM      | 0.0         | 0.0         |
|            |             | RAD/SEC                        |             |             |
| 297        | DSTAF       | DISTANCE ALONG BLADE FOR PLOT, | 1.9500E 01  | 1.3080E 01  |
|            |             | FT                             |             |             |
| 298        | TSCLE       | SCALE FACTOR FOR PLOT          | 5.0000E-01  | 5.0000E-01  |
| 299        | NVAR1       | NO. PARAMS. TO BE PLOTTED IN   | 4.0000E 01  | 4.0000E 01  |
|            |             | TRIM                           |             |             |
| 300        | NVAR2       | NO. PARAMS. TO BE PLOTTED IN   | 4.0000E 01  | 4.0000E 01  |
|            |             | FLY                            |             |             |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>14 | DESCRIPTION                                | AN-56A     | XH-51A     |
|------------------------------|------------|--|------------|------------|
| 301 NVECL(40)                |            | CODE NO. OF PARAM. TO BE<br>PLOTED IN TRIM | 1.0000E 00 | 1.0000E 00 |
| 302                          |            |  | 2.0000E 00 | 2.0000E 00 |
| 303                          |            |  | 3.0000E 00 | 3.0000E 00 |
| 304                          |            |  | 4.0000E 00 | 4.0000E 00 |
| 305                          |            |  | 1.0000E 01 | 1.0000E 01 |
| 306                          |            |  | 1.1000E 01 | 1.1000E 01 |
| 307                          |            |  | 1.2000E 01 | 1.2000E 01 |
| 308                          |            |  | 5.0000E 00 | 5.0000E 00 |
| 309                          |            |  | 8.0000E 00 | 8.0000E 00 |
| 310                          |            |  | 9.0000E 00 | 9.0000E 00 |
| 311                          |            |  | 6.0000E 00 | 6.0000E 00 |
| 312                          |            |  | 4.1000E 01 | 4.1000E 01 |
| 313                          |            |  | 5.3000E 01 | 5.3000E 01 |
| 314                          |            |  | 5.5000E 01 | 5.5000E 01 |
| 315                          |            |  | 5.6000E 01 | 5.6000E 01 |
| 316                          |            |  | 3.6000E 01 | 3.6000E 01 |
| 317                          |            |  | 4.3000E 01 | 4.3000E 01 |
| 318                          |            |  | 4.6000E 01 | 4.6000E 01 |
| 319                          |            |  | 5.9000E 01 | 5.9000E 01 |
| 320                          |            |  | 6.0000E 01 | 6.0000E 01 |
| 321                          |            |  | 1.3000E 01 | 1.3000E 01 |
| 322                          |            |  | 2.2000E 01 | 2.2000E 01 |
| 323                          |            |  | 4.4000E 01 | 4.4000E 01 |
| 324                          |            |  | 1.8000E 01 | 1.8000E 01 |
| 325                          |            |  | 3.1000E 01 | 3.1000E 01 |
| 326                          |            |  | 3.2000E 01 | 3.2000E 01 |
| 327                          |            |  | 8.3000E 01 | 8.3000E 01 |
| 328                          |            |  | 8.4000E 01 | 8.4000E 01 |
| 329                          |            |  | 7.0000E 00 | 7.0000E 00 |
| 330                          |            |  | 8.5000E 01 | 8.5000E 01 |
| 331                          |            |  | 8.6000E 01 | 8.6000E 01 |
| 332                          |            |  | 8.7000E 01 | 8.7000E 01 |
| 333                          |            |  | 8.8000E 01 | 8.8000E 01 |
| 334                          |            |  | 8.9000E 01 | 8.9000E 01 |
| 335                          |            |  | 4.7000E 01 | 4.7000E 01 |
| 336                          |            |  | 4.8000E 01 | 4.8000E 01 |

| REFOR DATA<br>R/A PRG.SYMBOL | PAGE<br>15 | DESCRIPTION                                | AM-56A      | XH-51A      |
|------------------------------|------------|--|-------------|-------------|
| 337                          |            |  | 3.3000E 01  | 4.9000E 01  |
| 338                          |            |  | 3.4000E 01  | 5.0000E 01  |
| 339                          |            |  | 1.4000E 01  | 1.4000E 01  |
| 340                          |            |  | 1.5000E 01  | 1.5000E 01  |
| 341 GRCI                     |            | AMCS DATA                                  | 0.0         | 0.0         |
| 342 QKXCSG                   |            | LONG. STICK SPRING, AMCS                   | 0.0         | 0.0         |
| 343 QKYCSG                   |            | LAT. STICK SPRING, AMCS                    | 0.0         | 0.0         |
| 344 PSIPG                    |            | ACTUATOR PHASE ANGLE (SWP.)<br>=PA(119)    | -1.5360E 00 | -1.5360E 00 |
| 345 CHIG                     |            | STICK-TO-GYRO PHASE ANGLE, AMCS<br>,RAD    | 0.0         | 0.0         |
| 346 KCYC                     |            | NOT USED                                   | 1.0300E 06  | 0.0         |
| 347 MUH                      |            | GYRO UNBALANCED MASS, SLUG                 | 0.0         | 0.0         |
| 348 PXPZ                     |            | GYRO UNBALANCED MASS, X DISPL.,<br>FT      | 0.0         | 0.0         |
| 349 PYPZ                     |            | GYRO UNBALANCED MASS, Y DISPL.,<br>FT      | 0.0         | 0.0         |
| 350 IZZGR                    |            | GYRO POLAR INERTIA, AMCS                   | 0.0         | 0.0         |
| 351 TAJACT                   |            | ACTUATOR TIME CONST., AMCS (SWP)<br>, SEC  | 2.5000E-02  | 2.5000E-02  |
| 352 GSKL                     |            | GYRO SPRING, ROLL, AMCS                    | 0.0         | 0.0         |
| 353 GSDL                     |            | GYRO SPRING, PITCH-ROLL COUPLING<br>, AMCS | 0.0         | 0.0         |

| REXOR DATA<br>R/A PFG.SY4B01 | PAGE<br>16 | DESCRIPTION                               | AH-56A      | XH-51A      |
|------------------------------|------------|---|-------------|-------------|
| 354 GFDDL                    |            | GYRO DAMPER, PITCH-ROLL COUPLNG<br>,AMCS  | 0.0         | 0.0         |
| 355 GSKM                     |            | GYRO SPRING, PITCH-ROLL COUPLNG<br>,AMCS  | 0.0         | 0.0         |
| 356 GSDM                     |            | GYRO SPRING, PITCH, AMCS                  | 0.0         | 0.0         |
| 357 GFKDM                    |            | GYRO DAMPER, PITCH-ROLL COUPLNG<br>,AMCS  | 0.0         | 0.0         |
| 358 GFDDM                    |            | GYRO DAMPER, PITCH, AMCS                  | 0.0         | 0.0         |
| 359 GFKDL                    |            | GYRO DAMPER, ROLL, AMCS                   | 0.0         | 0.0         |
| 360 IZZGVR                   |            | GYRO POLAR INERTIA, NON-ROTATING<br>,AMCS | 0.0         | 0.0         |
| 361 IXXG                     |            | ROLL INERTIA, (SWP.)                      | 2.2500E 01  | 3.7500E 00  |
| 362 GKK                      |            | GYRO-TO-SWASHPLATE GEAR RATIO<br>,AMCS    | 2.3000E-01  | 0.0         |
| 363 GRD                      |            | GYRO-TO-SWASHPLATE GEAR RATIO<br>,AMCS    | 2.4700E-01  | 0.0         |
| 364 XTHTF                    |            | PARTIAL (X-FUSELAGE/THETA-SHIFT)          | -2.6950E 00 | -2.6950E 00 |
| 365 YPHIF                    |            | PARTIAL (Y-FUSELAGE/PHI-SHAFT)            | 2.6950E 00  | 2.6950E 00  |
| 366 HMASS                    |            | HUB MASS, SLUG                            | 1.8600E 01  | 8.1200E 00  |
| 367 MXXGF                    |            | ADDED FUSELAGE ROLL MOMENT                | 0.0         | 0.0         |
| 368 MYVGF                    |            | ADDED FUSELAGE PITCH MOMENT               | 0.0         | 0.0         |
| 369 MZZGF                    |            | ADDED FUSELAGE YAW MOMENT                 | 0.0         | 0.0         |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>17 | DESCRIPTION                         | AM-56A      | XH-51A      |
|------------------------------|------------|-------------------------------------|-------------|-------------|
| 370 NHLL                     |            | VEHICLE FLAG 0=AH56A .NE.0=AAH      | 0.0         | 0.0         |
| 371 TCL                      |            | NOT USED                            | 0.0         | 0.0         |
| 372 XF8AR                    |            | AFT DIST. FUSFLAGE TO C.G.,FT       | -1.7500E-01 | 2.0000E-02  |
| 373 YF9AP                    |            | WT. DIST. FUSELAGE TO C.G.,FT       | -1.0400E-01 | -3.2000E-01 |
| 374 ZF9AR                    |            | DOWN DIST. FUSELAGE TO C.G.,FT      | 2.9200E-01  | 7.8000E-01  |
| 375 FKS                      |            | SHAFT BENDING SPRING                | 3.4000E 06  | 3.4000E 06  |
| 376 KPHCJN                   |            | SWASHPLATE SPRING,ROLL=RA(126)      | 4.1000E 03  | 7.3000E 02  |
| 377 KTHCJN                   |            | SWASHPLATE SPRING,PITCH<br>=RA(127) | 4.1000E 03  | 7.3000E 02  |
| 378 CPHDSP                   |            | SWASHPLATE DAMPER,ROLL=RA(121)      | 1.0570E 03  | 1.5000E 02  |
| 379 CTHDSP                   |            | SWASHPLATE DAMPER,PITCH<br>=RA(122) | 1.0570E 03  | 1.5000E 02  |
| 380 ***** (15)               |            | PT (C) DATA - NOT USED              |             |             |
| 381                          |            |                                     | 1.0700E-02  | 5.4160E-03  |
| 382                          |            |                                     | 2.2580E-04  | 4.7180E-05  |
| 383                          |            |                                     | -3.4510E-03 | -2.2690E-04 |
| 384                          |            |                                     | -6.1790E-03 | -4.3460E-03 |
| 385                          |            |                                     | 2.8410E-02  | 3.0720E-02  |
| 386                          |            |                                     | -8.0910E-02 | -8.6160E-02 |
| 387                          |            |                                     | 2.0300E-02  | 1.9340E-02  |
| 388                          |            |                                     | 3.8300E-04  | 1.6720E-04  |
| 389                          |            |                                     | -6.5390E-03 | -8.1020E-04 |
| 390                          |            |                                     | -1.1510E-02 | -5.6020E-03 |
| 391                          |            |                                     | 3.5410E-02  | 3.6090E-02  |
| 392                          |            |                                     | -7.7620E-02 | -1.0390E-01 |
| 393                          |            |                                     | 2.9170E 00  | 1.2080E 00  |
| 394                          |            |                                     | 0.0         | 0.0         |
|                              |            |                                     | 0.0         | 0.0         |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>18 | DESCRIPTION                                   | AH-56A      | XH-51A |
|------------------------------|------------|---|-------------|--------|
| 395 KFPHG                    |            | GYRD FRICTION,AMCS                            | 0.0         | 0.0    |
| 396 REAL                     |            | EQUIV. RADIUS AT INBOARD END OF<br>FDBK LEVER | 4.3600E-01  | 0.0    |
| 397 PSIFBL                   |            | ANGLE INBOARD END OF FDBK LEVR<br>LEADS BLADE | 4.0700E-01  | 0.0    |
| 398 CAPHIS                   |            | COEF. FOR PHI, IN SHAFT BENDING<br>(SWP.)     | 5.2000E-01  | 0.0    |
| 399 IFLEX                    |            | SHAFT BENDING FLAG<br>0=OFF, 1=ON             | 0.0         | 0.0    |
| 400 ROFFT                    |            | 0 KULL RATE FET .NE.0<br>REACTIONLESS FLAP    | 0.0         | 0.0    |
| 401 OPEN(36)                 |            |   | -4.1310E-01 | 0.0    |
| 402                          |            |   | -1.4240E 00 | 0.0    |
| 403                          |            |   | -3.5910E-02 | 0.0    |
| 404                          |            |   | 3.1260E-01  | 0.0    |
| 405                          |            |   | 3.2240E 00  | 0.0    |
| 406                          |            |   | 4.6540E-01  | 0.0    |
| 407                          |            |   | 4.1540E 01  | 0.0    |
| 408                          |            |   | 3.2890E 02  | 0.0    |
| 409                          |            |   | 2.8560E 00  | 0.0    |
| 410                          |            |   | -2.9630E-01 | 0.0    |
| 411                          |            |   | -8.1220E-01 | 0.0    |
| 412                          |            |   | -2.1280E-02 | 0.0    |
| 413                          |            |   | 3.1630E 00  | 0.0    |
| 414                          |            |   | 1.3110E 01  | 0.0    |
| 415                          |            |   | -7.1290E-02 | 0.0    |
| 416                          |            |   | -3.3300E 00 | 0.0    |
| 417                          |            |   | -4.6780E 01 | 0.0    |
| 418                          |            |   | -4.3960E 00 | 0.0    |
| 419                          |            |   | -1.8650E-01 | 0.0    |
| 420                          |            |   | -3.8220E-01 | 0.0    |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>19 | DESCRIPTION                           | AH-56A      | XH-51A     |
|------------------------------|------------|---------------------------------------|-------------|------------|
| 421                          |            |                                       | -2.3480E-02 | 0.0        |
| 422                          |            |                                       | -7.1890E-01 | 0.0        |
| 423                          |            |                                       | -2.4370E 00 | 0.0        |
| 424                          |            |                                       | 4.6510E-02  | 0.0        |
| 425                          |            |                                       | -9.6930E 01 | 0.0        |
| 426                          |            |                                       | -3.6890E 02 | 0.0        |
| 427                          |            |                                       | -1.2510E 00 | 0.0        |
| 428                          |            |                                       | -3.3180E-01 | 0.0        |
| 429                          |            |                                       | -1.0290E 00 | 0.0        |
| 430                          |            |                                       | -3.6540E-02 | 0.0        |
| 431                          |            |                                       | -2.4440E 00 | 0.0        |
| 432                          |            |                                       | -1.3750E 01 | 0.0        |
| 433                          |            |                                       | -4.4050E-01 | 0.0        |
| 434                          |            |                                       | 2.2650E 01  | 0.0        |
| 435                          |            |                                       | 9.8650E 01  | 0.0        |
| 436                          |            |                                       | 3.6420E 00  | 0.0        |
| 437 XCPDL                    |            | MAX.LONG.STICK ACTUATOR RATE<br>LIMIT | 1.5000E 00  | 1.0000E 03 |
| 438 YCPDL                    |            | MAX.LAT.STICK ACTUATOR RATE<br>LIMIT  | 1.0000E 00  | 1.0000E 03 |
| 439 FGE3F                    |            | FILTERED GYRO YAW MOMENT              | 0.0         | 0.0        |
| 440 FAST                     |            | SINGLE BLADE TRIM FLAG<br>0=OFF,1=ON  | 3.0000E 00  | 0.0        |
| 441 FMV(6,8)                 |            | FUSFLAGE AIRLOAD                      | 0.0         | 0.0        |
| 442                          |            |                                       | 0.0         | 0.0        |
| 443                          |            |                                       | 0.0         | 0.0        |
| 444                          |            |                                       | -3.0000E-02 | 2.6000E-02 |
| 445                          |            |                                       | 0.0         | 0.0        |
| 446                          |            |                                       | 0.0         | 0.0        |
| 447                          |            |                                       | -1.8500E-01 | 0.0        |
| 448                          |            |                                       | 0.0         | 0.0        |
| 449                          |            |                                       | 0.0         | 0.0        |

REXOR DATA PAGE 20  
R/A PPG.SYMBOL DESCRIPTION

|     | AM-56A      | XH-51A      |
|-----|-------------|-------------|
| 450 | 0.0         | 0.0         |
| 451 | -6.2000E 00 | 0.0         |
| 452 | 0.0         | 0.0         |
| 453 | 0.0         | 0.0         |
| 454 | -2.3200E-01 | -6.5000E-02 |
| 455 | 0.0         | 0.0         |
| 456 | -3.7000E-01 | -1.3000E-01 |
| 457 | 0.0         | 0.0         |
| 458 | -6.6000E-01 | 0.0         |
| 459 | 0.0         | 0.0         |
| 460 | 0.0         | 0.0         |
| 461 | 0.0         | 0.0         |
| 462 | -2.4200E 01 | -5.0000E 00 |
| 463 | 0.0         | 0.0         |
| 464 | 0.0         | 0.0         |
| 465 | 0.0         | 0.0         |
| 466 | 0.0         | 0.0         |
| 467 | -1.0200E-01 | -8.1000E-02 |
| 468 | 0.0         | 0.0         |
| 469 | -2.8200E 00 | -1.3500E 00 |
| 470 | 0.0         | 0.0         |
| 471 | 0.0         | 0.0         |
| 472 | -9.7000E-02 | -2.7000E-02 |
| 473 | 0.0         | 0.0         |
| 474 | 1.6900E-01  | -3.1000E-02 |
| 475 | 0.0         | 0.0         |
| 476 | 2.5900E 00  | 6.5000E-01  |
| 477 | 0.0         | 0.0         |
| 478 | 0.0         | 0.0         |
| 479 | 0.0         | 0.0         |
| 480 | 0.0         | 0.0         |
| 481 | 0.0         | 0.0         |
| 482 | 0.0         | 0.0         |
| 483 | 0.0         | 0.0         |
| 484 | 0.0         | 0.0         |
| 485 | 0.0         | 0.0         |
| 486 | 0.0         | 0.0         |



| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>21 | DESCRIPTION                                    | AM-56A     | XH-51A     |
|------------------------------|------------|--|------------|------------|
| 487                          |            |  | 0.0        | 0.0        |
| 488                          |            |  | 0.0        | 0.0        |
| 489 GANYAG                   |            | FOTUR-TU-GYRO FEEDBACK ANGLE                   | 0.0        | 0.0        |
| 490 IAMCS                    |            | FLAG FOR AMCS<br>0=ICS,1=AMCS                  | 0.0        | 0.0        |
| 491 QIXS                     |            | NOT USED                                       | 0.0        | 0.0        |
| 492 QKFEED                   |            | AMCS FEEDBACK SPRING                           | 0.0        | 0.0        |
| 493 TCG1                     |            | AMCS GYRO ACTUATOR TIME CONST.<br>,SEC         | 0.0        | 0.0        |
| 494 YCSMAX                   |            | LAT.STICK TRAVEL LIMIT                         | 1.0000E 03 | 1.0000E 03 |
| 495 GK1L                     |            | AMCS ACT. RATE LIMIT                           | 1.0000E 03 | 0.0        |
| 496 GD1L                     |            | AMCS ACT. RATE LIMIT                           | 1.0000E 03 | 0.0        |
| 497 DISTCN                   |            | BLADE STA.(FT.) FOR BLADE-<br>CANOPY CLEARANCE | 0.0        | 0.0        |
| 498 NRAD                     |            | NO. OF BLADE STATIONS                          | 1.3000E 01 | 1.3000E 01 |
| 499 NINC                     |            | INCREMENT OF STATIONS                          | 1.0000E 00 | 1.0000E 00 |
| 500 KSTART                   |            | STARTING STATION                               | 2.0000E 00 | 2.0000E 00 |
| 501 SX(40)                   |            | DISTANCE ALONG BLADE,FT                        | 1.5000E 00 | 5.0000E-01 |
| 502                          |            |  | 2.5830E 00 | 5.1000E-01 |
| 503                          |            |  | 5.1660E 00 | 3.7500E 00 |
| 504                          |            |  | 6.8330E 00 | 6.0830E 00 |
| 505                          |            |  | 8.5820E 00 | 7.8330E 00 |
| 506                          |            |  | 1.0720E 01 | 9.5830E 00 |
| 507                          |            |  | 1.2670E 01 | 1.0670E 01 |

REXOR DATA PAGE 22  
R/A PRG.SYMBOL DESCRIPTION

|            |            |            |  |
|------------|------------|------------|--|
| 508        | 1.4500E 01 | 1.1670E 01 |  |
| 509        | 1.7080E 01 | 1.3080E 01 |  |
| 510        | 1.9580E 01 | 1.4330E 01 |  |
| 511        | 2.2500E 01 | 1.5420E 01 |  |
| 512        | 2.3570E 01 | 1.6420E 01 |  |
| 513        | 2.5620E 01 | 1.7500E 01 |  |
| 514        | 0.0        | 0.0        |  |
| 515        | 0.0        | 0.0        |  |
| 516        | 0.0        | 0.0        |  |
| 517        | 0.0        | 0.0        |  |
| 518        | 0.0        | 0.0        |  |
| 519        | 0.0        | 0.0        |  |
| 520        | 0.0        | 0.0        |  |
| 521        | 0.0        | 0.0        |  |
| 522        | 0.0        | 0.0        |  |
| 523        | 0.0        | 0.0        |  |
| 524        | 0.0        | 0.0        |  |
| 525        | 0.0        | 0.0        |  |
| 526        | 0.0        | 0.0        |  |
| 527        | 0.0        | 0.0        |  |
| 528        | 0.0        | 0.0        |  |
| 529        | 0.0        | 0.0        |  |
| 530        | 0.0        | 0.0        |  |
| 531        | 0.0        | 0.0        |  |
| 532        | 0.0        | 0.0        |  |
| 533        | 0.0        | 0.0        |  |
| 534        | 0.0        | 0.0        |  |
| 535        | 0.0        | 0.0        |  |
| 536        | 0.0        | 0.0        |  |
| 537        | 0.0        | 0.0        |  |
| 538        | 0.0        | 0.0        |  |
| 539        | 0.0        | 0.0        |  |
| 540        | 0.0        | 0.0        |  |
| 541 QM(40) | 1.7100E-01 | 3.1170E-01 |  |
| 542        | 7.9740E-01 | 6.3490E-01 |  |

MASS/LENGTH ALONG BLADE  
SLUG/FT

REXOR DATA PAGE 23  
R/A PFG.SYMBOL DESCRIPTION

|     | AM-56A     | XN-51A     |
|-----|------------|------------|
| 543 | 1.0290E 00 | 2.6600E-01 |
| 544 | 1.3800E 00 | 1.3800E-01 |
| 545 | 4.3820E-01 | 1.2990E-01 |
| 546 | 3.1680E-01 | 1.3200E-01 |
| 547 | 3.4020E-01 | 1.4240E-01 |
| 548 | 5.5670E-01 | 1.4700E-01 |
| 549 | 2.9570E-01 | 1.0730E-01 |
| 550 | 2.4040E-01 | 1.4350E-01 |
| 551 | 2.9910E-01 | 1.2580E-01 |
| 552 | 3.8420E-01 | 8.5120E-02 |
| 553 | 8.7370E-01 | 3.0120E-01 |
| 554 | 0.0        | 0.0        |
| 555 | 0.0        | 0.0        |
| 556 | 0.0        | 0.0        |
| 557 | 0.0        | 0.0        |
| 558 | 0.0        | 0.0        |
| 559 | 0.0        | 0.0        |
| 560 | 0.0        | 0.0        |
| 561 | 0.0        | 0.0        |
| 562 | 0.0        | 0.0        |
| 563 | 0.0        | 0.0        |
| 564 | 0.0        | 0.0        |
| 565 | 0.0        | 0.0        |
| 566 | 0.0        | 0.0        |
| 567 | 0.0        | 0.0        |
| 568 | 0.0        | 0.0        |
| 569 | 0.0        | 0.0        |
| 570 | 0.0        | 0.0        |
| 571 | 0.0        | 0.0        |
| 572 | 0.0        | 0.0        |
| 573 | 0.0        | 0.0        |
| 574 | 0.0        | 0.0        |
| 575 | 0.0        | 0.0        |
| 576 | 0.0        | 0.0        |
| 577 | 0.0        | 0.0        |
| 578 | 0.0        | 0.0        |
| 579 | 0.0        | 0.0        |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>24 | DESCRIPTION                                     | AM-56A     | XH-51A     |
|------------------------------|------------|---|------------|------------|
| 580                          |            |   | 0.0        | 0.0        |
| 581 VEJ1                     |            | INITIAL AIRSPEED, LONG. STICK<br>DESENSITIZER   | 1.8600E 02 | 0.0        |
| 582 DVF01                    |            | AIKSPEED, FULL LONG. STICK<br>DESENSITIZER      | 1.0100E 02 | 0.0        |
| 583 VEJ2                     |            | INITIAL AIRSPEED, XCS-P COUPLNG                 | 1.8600E 02 | 0.0        |
| 584 DVEQ2                    |            | AIKSPEED, FULL XCS-P COUPLNG                    | 1.5200E 02 | 0.0        |
| 585 KXCS                     |            | LONG. DESENSITIZER FEEDBACK<br>RATIO            | 5.0000E-01 | 0.0        |
| 586 KYCS                     |            | LAT. DESENSITIZER FEEDBACK<br>RATIO             | 0.0        | 0.0        |
| 587 KXPR                     |            | XCS-P FEEDBACK RATIO                            | 1.2000E-01 | 0.0        |
| 588 XCS1                     |            | LONG. DESENSITIZER LIMIT                        | 4.1700E-02 | 0.0        |
| 589 XCS2                     |            | LONG. DESENSITIZER PLUS XCS-P<br>FEEDBACK LIMIT | 5.8300E-02 | 0.0        |
| 590 YCS1                     |            | LAT. DESENSITIZER LIMIT                         | 1.0000E-01 | 0.0        |
| 591 PQENG                    |            | ENGINE INPUTS                                   | 1.1200E 04 | 0.0        |
| 592 PQEQ4                    |            | ENGINE INPUTS                                   | 5.0000E 03 | 0.0        |
| 593 K1PRM                    |            | ENGINE INPUTS                                   | 1.0000E 00 | 0.0        |
| 594 K2PRM                    |            | ENGINE INPUTS                                   | 3.3000E 00 | 0.0        |
| 595 TAJG                     |            | ENGINE INPUTS                                   | 7.5000E-01 | 1.0000E 00 |

| REXDR DATA<br>R/A PRG.SYMBOL | PAGE<br>25 | DESCRIPTION                                    | AM-56A      | XH-51A      |
|------------------------------|------------|--|-------------|-------------|
| 596 TAUC                     |            | ENGINE INPUTS                                  | 0.0         | 0.0         |
| 597 NYD(4)                   |            | SELECTIVE PERTURBATION INCPMNT<br>FOR A MATRIX | 0.0         | 0.0         |
| 598                          |            |  | 0.0         | 0.0         |
| 599                          |            |  | 0.0         | 0.0         |
| 600                          |            |  | 0.0         | 0.0         |
| 601 SY(40)                   |            | CHORDWISE DISTANCE ON BLADE                    | 0.0         | 0.0         |
| 602                          |            |  | -2.0260E-02 | 0.0         |
| 603                          |            |  | -2.4980E-01 | -1.0400E-01 |
| 604                          |            |  | -2.3170E-01 | -4.0000E-02 |
| 605                          |            |  | -1.0720E-01 | -2.8000E-02 |
| 606                          |            |  | -4.0050E-01 | -6.7000E-03 |
| 607                          |            |  | -1.2550E-02 | -3.3000E-03 |
| 608                          |            |  | -2.8110E-02 | 0.0         |
| 609                          |            |  | -2.6010E-03 | 5.4000E-03  |
| 610                          |            |  | -3.8600E-03 | 5.4000E-03  |
| 611                          |            |  | -7.9080E-02 | 5.4000E-03  |
| 612                          |            |  | 5.7500E-02  | 5.4000E-03  |
| 613                          |            |  | -1.7380E-02 | 5.4000E-03  |
| 614                          |            |  | 0.0         | 0.0         |
| 615                          |            |  | 0.0         | 0.0         |
| 616                          |            |  | 0.0         | 0.0         |
| 617                          |            |  | 0.0         | 0.0         |
| 618                          |            |  | 0.0         | 0.0         |
| 619                          |            |  | 0.0         | 0.0         |
| 620                          |            |  | 0.0         | 0.0         |
| 621                          |            |  | 0.0         | 0.0         |
| 622                          |            |  | 0.0         | 0.0         |
| 623                          |            |  | 0.0         | 0.0         |
| 624                          |            |  | 0.0         | 0.0         |
| 625                          |            |  | 0.0         | 0.0         |
| 626                          |            |  | 0.0         | 0.0         |
| 627                          |            |  | 0.0         | 0.0         |
| 628                          |            |  | 0.0         | 0.0         |
| 629                          |            |  | 0.0         | 0.0         |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>26 | DESCRIPTION               | AH-56A | XH-51A |
|------------------------------|------------|---------------------------|--------|--------|
| 630                          |            |                           | 0.0    | 0.0    |
| 631                          |            |                           | 0.0    | 0.0    |
| 632                          |            |                           | 0.0    | 0.0    |
| 633                          |            |                           | 0.0    | 0.0    |
| 634                          |            |                           | 0.0    | 0.0    |
| 635                          |            |                           | 0.0    | 0.0    |
| 636                          |            |                           | 0.0    | 0.0    |
| 637                          |            |                           | 0.0    | 0.0    |
| 638                          |            |                           | 0.0    | 0.0    |
| 639                          |            |                           | 0.0    | 0.0    |
| 640                          |            |                           | 0.0    | 0.0    |
| 641                          | PSITB(20)  | PILOT ENGINE SPEED        | 0.0    | 0.0    |
| 642                          |            |                           | 0.0    | 0.0    |
| 643                          |            |                           | 0.0    | 0.0    |
| 644                          |            |                           | 0.0    | 0.0    |
| 645                          |            |                           | 0.0    | 0.0    |
| 646                          |            |                           | 0.0    | 0.0    |
| 647                          |            |                           | 0.0    | 0.0    |
| 648                          |            |                           | 0.0    | 0.0    |
| 649                          |            |                           | 0.0    | 0.0    |
| 650                          |            |                           | 0.0    | 0.0    |
| 651                          |            |                           | 0.0    | 0.0    |
| 652                          |            |                           | 0.0    | 0.0    |
| 653                          |            |                           | 0.0    | 0.0    |
| 654                          |            |                           | 0.0    | 0.0    |
| 655                          |            |                           | 0.0    | 0.0    |
| 656                          |            |                           | 0.0    | 0.0    |
| 657                          |            |                           | 0.0    | 0.0    |
| 658                          |            |                           | 0.0    | 0.0    |
| 659                          |            |                           | 0.0    | 0.0    |
| 660                          |            |                           | 0.0    | 0.0    |
| 661                          | GLCN       | GYRO ROLL CONTROL MOMENT  | 0.0    | 0.0    |
| 662                          | GMEN       | GYRO PITCH CONTROL MOMENT | 0.0    | 0.0    |

| RFXDR DATA<br>R/A PRG.SYMBOL | PAGE<br>27 | DESCRIPTION                               | AM-56A | XM-51A     |
|------------------------------|------------|---|--------|------------|
| 663 OPEN                     |            |   | 0.0    | 0.0        |
| 664 APHI                     |            | GAIN FACTORS IN CONTROL EQ.S<br>A-PHI     | 0.0    | 0.0        |
| 665 3PHI                     |            | GAIN FACTORS IN CONTROL EQ.S<br>R-PHI     | 0.0    | 0.0        |
| 666 APSI                     |            | GAIN FACTORS IN CONTROL EQ.S<br>A-PSI     | 0.0    | 0.0        |
| 667 BPSI                     |            | GAIN FACTORS IN CONTROL EQ.S<br>R-PSI     | 0.0    | 0.0        |
| 668 ATH                      |            | GAIN FACTORS IN CONTROL EQ.S<br>A-THETA   | 0.0    | 0.0        |
| 669 BTH                      |            | GAIN FACTORS IN CONTROL EQ.S<br>H-THETA   | 0.0    | 0.0        |
| 670 ATC                      |            | GAIN FACTORS IN CONTROL EQ.S<br>A-THETA-C | 0.0    | 0.0        |
| 671 OPEN(10)                 |            | OPEN                                      | 0.0    | 0.0        |
| 672                          |            |   | 0.0    | 0.0        |
| 673                          |            |   | 0.0    | 0.0        |
| 674                          |            |   | 0.0    | 0.0        |
| 675                          |            |   | 0.0    | 0.0        |
| 676                          |            |   | 0.0    | 0.0        |
| 677                          |            |   | 0.0    | 0.0        |
| 678                          |            |   | 0.0    | 0.0        |
| 679                          |            |   | 0.0    | 0.0        |
| 680 NMPAT                    |            | NO. OF AUTOPILOT POINTS                   | 0.0    | 2.0000E 01 |
| 681 PTAUTO(20)               |            | AUTOPILOT TIME                            | 0.0    | 0.0        |
| 682                          |            |   | 0.0    | 0.0        |

REXOR DATA PAGE 28  
R/A PRG-SYMBOL DESCRIPTION

|     |            |                       |  |
|-----|------------|-----------------------|--|
| 683 |            |                       |  |
| 684 |            |                       |  |
| 685 |            |                       |  |
| 686 |            |                       |  |
| 687 |            |                       |  |
| 688 |            |                       |  |
| 689 |            |                       |  |
| 690 |            |                       |  |
| 691 |            |                       |  |
| 692 |            |                       |  |
| 693 |            |                       |  |
| 694 |            |                       |  |
| 695 |            |                       |  |
| 696 |            |                       |  |
| 697 |            |                       |  |
| 698 |            |                       |  |
| 699 |            |                       |  |
| 700 |            |                       |  |
| 701 | 0XCSAT(20) | AUTCPILOT LONG. STICK |  |
| 702 |            |                       |  |
| 703 |            |                       |  |
| 704 |            |                       |  |
| 705 |            |                       |  |
| 706 |            |                       |  |
| 707 |            |                       |  |
| 708 |            |                       |  |
| 709 |            |                       |  |
| 710 |            |                       |  |
| 711 |            |                       |  |
| 712 |            |                       |  |
| 713 |            |                       |  |
| 714 |            |                       |  |
| 715 |            |                       |  |
| 716 |            |                       |  |
| 717 |            |                       |  |
| 718 |            |                       |  |



| REXOR DATA<br>R/A PKG.SYMBOL | PAGE<br>29  | DESCRIPTION          | AH-56A | XH-51A |
|------------------------------|-------------|----------------------|--------|--------|
| 719                          |             |                      | 0.0    | 0.0    |
| 720                          |             |                      | 0.0    | 0.0    |
| 721                          | PVC SAT(20) | AUTUPILOT LAT. STICK | 0.0    | 0.0    |
| 722                          |             |                      | 0.0    | 0.0    |
| 723                          |             |                      | 0.0    | 0.0    |
| 724                          |             |                      | 0.0    | 0.0    |
| 725                          |             |                      | 0.0    | 0.0    |
| 726                          |             |                      | 0.0    | 0.0    |
| 727                          |             |                      | 0.0    | 0.0    |
| 728                          |             |                      | 0.0    | 0.0    |
| 729                          |             |                      | 0.0    | 0.0    |
| 730                          |             |                      | 0.0    | 0.0    |
| 731                          |             |                      | 0.0    | 0.0    |
| 732                          |             |                      | 0.0    | 0.0    |
| 733                          |             |                      | 0.0    | 0.0    |
| 734                          |             |                      | 0.0    | 0.0    |
| 735                          |             |                      | 0.0    | 0.0    |
| 736                          |             |                      | 0.0    | 0.0    |
| 737                          |             |                      | 0.0    | 0.0    |
| 738                          |             |                      | 0.0    | 0.0    |
| 739                          |             |                      | 0.0    | 0.0    |
| 740                          |             |                      | 0.0    | 0.0    |
| 741                          | PTH DAT(20) | AUTUPILOT COLLECTIVE | 0.0    | 0.0    |
| 742                          |             |                      | 0.0    | 0.0    |
| 743                          |             |                      | 0.0    | 0.0    |
| 744                          |             |                      | 0.0    | 0.0    |
| 745                          |             |                      | 0.0    | 0.0    |
| 746                          |             |                      | 0.0    | 0.0    |
| 747                          |             |                      | 0.0    | 0.0    |
| 748                          |             |                      | 0.0    | 0.0    |
| 749                          |             |                      | 0.0    | 0.0    |
| 750                          |             |                      | 0.0    | 0.0    |
| 751                          |             |                      | 0.0    | 0.0    |
| 752                          |             |                      | 0.0    | 0.0    |
| 753                          |             |                      | 0.0    | 0.0    |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>30  | DESCRIPTION           | AM-56A     | XM-51A     |
|------------------------------|-------------|-----------------------|------------|------------|
| 754                          |             |                       | 0.0        | 0.0        |
| 755                          |             |                       | 0.0        | 0.0        |
| 756                          |             |                       | 0.0        | 0.0        |
| 757                          |             |                       | 0.0        | 0.0        |
| 758                          |             |                       | 0.0        | 0.0        |
| 759                          |             |                       | 0.0        | 0.0        |
| 760                          |             |                       | 0.0        | 0.0        |
| 761                          | BMS17(40,4) | INPLANE Y0 COORDINATE | 0.0        | 0.0        |
| 762                          |             |                       | 3.9370E-03 | 0.0        |
| 763                          |             |                       | 6.6880E-02 | 8.6790E-02 |
| 764                          |             |                       | 1.2250E-01 | 1.9250E-01 |
| 765                          |             |                       | 1.8390E-01 | 2.9060E-01 |
| 766                          |             |                       | 2.7340E-01 | 4.0260E-01 |
| 767                          |             |                       | 3.4670E-01 | 4.7790E-01 |
| 768                          |             |                       | 4.2910E-01 | 5.5030E-01 |
| 769                          |             |                       | 5.5300E-01 | 6.5650E-01 |
| 770                          |             |                       | 6.8040E-01 | 7.5260E-01 |
| 771                          |             |                       | 8.3420E-01 | 8.3690E-01 |
| 772                          |             |                       | 8.9110E-01 | 9.1510E-01 |
| 773                          |             |                       | 1.0000E 00 | 1.0000E 00 |
| 774                          |             |                       | 0.0        | 0.0        |
| 775                          |             |                       | 0.0        | 0.0        |
| 776                          |             |                       | 0.0        | 0.0        |
| 777                          |             |                       | 0.0        | 0.0        |
| 778                          |             |                       | 0.0        | 0.0        |
| 779                          |             |                       | 0.0        | 0.0        |
| 780                          |             |                       | 0.0        | 0.0        |
| 781                          |             |                       | 0.0        | 0.0        |
| 782                          |             |                       | 0.0        | 0.0        |
| 783                          |             |                       | 0.0        | 0.0        |
| 784                          |             |                       | 0.0        | 0.0        |
| 785                          |             |                       | 0.0        | 0.0        |
| 786                          |             |                       | 0.0        | 0.0        |
| 787                          |             |                       | 0.0        | 0.0        |
| 788                          |             |                       | 0.0        | 0.0        |
| 789                          |             |                       | 0.0        | 0.0        |

REXOR DATA PAGE 31  
R/A PKG.SYMBOL DESCRIPTION

|     | 4H-56A      | XH-51A      |
|-----|-------------|-------------|
| 790 | 0.0         | 0.0         |
| 791 | 0.0         | 0.0         |
| 792 | 0.0         | 0.0         |
| 793 | 0.0         | 0.0         |
| 794 | 0.0         | 0.0         |
| 795 | 0.0         | 0.0         |
| 796 | 0.0         | 0.0         |
| 797 | 0.0         | 0.0         |
| 798 | 0.0         | 0.0         |
| 799 | 0.0         | 0.0         |
| 800 | 0.0         | 0.0         |
| 801 | 0.0         | 0.0         |
| 802 | 0.0         | 0.0         |
| 803 | -2.3470E-03 | 0.0         |
| 804 | -3.1370E-02 | -1.6900E-02 |
| 805 | -4.7070E-02 | -1.5130E-02 |
| 806 | -5.8100E-02 | -1.0900E-02 |
| 807 | -5.9610E-02 | -7.1610E-03 |
| 808 | -5.4100E-02 | -5.6180E-03 |
| 809 | -4.5230E-02 | -5.1970E-03 |
| 810 | -3.0470E-02 | -5.8260E-03 |
| 811 | -1.5080E-02 | -7.2600E-03 |
| 812 | 2.9210E-03  | -9.2180E-03 |
| 813 | 9.4600E-03  | -1.1400E-02 |
| 814 | 2.1840E-02  | -1.3920E-02 |
| 815 | 0.0         | 0.0         |
| 816 | 0.0         | 0.0         |
| 817 | 0.0         | 0.0         |
| 818 | 0.0         | 0.0         |
| 819 | 0.0         | 0.0         |
| 820 | 0.0         | 0.0         |
| 821 | 0.0         | 0.0         |
| 822 | 0.0         | 0.0         |
| 823 | 0.0         | 0.0         |
| 824 | 0.0         | 0.0         |
| 825 | 0.0         | 0.0         |
| 826 | 0.0         | 0.0         |

INPLANE Z0 COORDINATE

REXOR DATA PAGE 32  
R/A PRG.SYMBOL DESCRIPTION

|     | AH-56A     | XH-51A     |
|-----|------------|------------|
| 827 | 0.0        | 0.0        |
| 828 | 0.0        | 0.0        |
| 829 | 0.0        | 0.0        |
| 830 | 0.0        | 0.0        |
| 831 | 0.0        | 0.0        |
| 832 | 0.0        | 0.0        |
| 833 | 0.0        | 0.0        |
| 834 | 0.0        | 0.0        |
| 835 | 0.0        | 0.0        |
| 836 | 0.0        | 0.0        |
| 837 | 0.0        | 0.0        |
| 838 | 0.0        | 0.0        |
| 839 | 0.0        | 0.0        |
| 840 | 0.0        | 0.0        |
| 841 | 0.0        | 0.0        |
| 842 | 2.0210E-02 | 0.0        |
| 843 | 3.1950E-02 | 3.9080E-02 |
| 844 | 3.4240E-02 | 5.1640E-02 |
| 845 | 3.6350E-02 | 6.0200E-02 |
| 846 | 4.0350E-02 | 6.7580E-02 |
| 847 | 4.3390E-02 | 7.1040E-02 |
| 848 | 4.6420E-02 | 7.3560E-02 |
| 849 | 4.9610E-02 | 7.6120E-02 |
| 850 | 5.2050E-02 | 7.7440E-02 |
| 851 | 5.3070E-02 | 7.8090E-02 |
| 852 | 5.3180E-02 | 7.8340E-02 |
| 853 | 5.3250E-02 | 7.8400E-02 |
| 854 | 0.0        | 0.0        |
| 855 | 0.0        | 0.0        |
| 856 | 0.0        | 0.0        |
| 857 | 0.0        | 0.0        |
| 858 | 0.0        | 0.0        |
| 859 | 0.0        | 0.0        |
| 860 | 0.0        | 0.0        |
| 861 | 0.0        | 0.0        |
| 862 | 0.0        | 0.0        |
| 863 | 0.0        | 0.0        |

INPLANE Y-PRJ-O CCORDINATF

REXOR DATA PAGE 33  
R/A PRG.SYMBOL DESCRIPTION

|     | AM-56A      | XH-51A      |
|-----|-------------|-------------|
| 864 | 0.0         | 0.0         |
| 865 | 0.0         | 0.0         |
| 866 | 0.0         | 0.0         |
| 867 | 0.0         | 0.0         |
| 868 | 0.0         | 0.0         |
| 869 | 0.0         | 0.0         |
| 870 | 0.0         | 0.0         |
| 871 | 0.0         | 0.0         |
| 872 | 0.0         | 0.0         |
| 873 | 0.0         | 0.0         |
| 874 | 0.0         | 0.0         |
| 875 | 0.0         | 0.0         |
| 876 | 0.0         | 0.0         |
| 877 | 0.0         | 0.0         |
| 878 | 0.0         | 0.0         |
| 879 | 0.0         | 0.0         |
| 880 | 0.0         | 0.0         |
| 881 | 0.0         | 0.0         |
| 882 | -1.1470E-02 | 0.0         |
| 883 | -1.0260E-02 | -2.3420E-03 |
| 884 | -8.1980E-03 | 2.2320E-03  |
| 885 | -3.8520E-03 | 2.1020E-03  |
| 886 | 1.8240E-03  | 1.1780E-03  |
| 887 | 4.0570E-03  | 5.0210E-04  |
| 888 | 5.3380E-03  | -1.3530E-04 |
| 889 | 5.9730E-03  | -1.0100E-03 |
| 890 | 6.1570E-03  | -1.6550E-03 |
| 891 | 6.1110E-03  | -2.0800E-03 |
| 892 | 6.0690E-03  | -2.2910E-03 |
| 893 | 6.0360E-03  | -2.3610E-03 |
| 894 | 0.0         | 0.0         |
| 895 | 0.0         | 0.0         |
| 896 | 0.0         | 0.0         |
| 897 | 0.0         | 0.0         |
| 898 | 0.0         | 0.0         |
| 899 | 0.0         | 0.0         |
| 900 | 0.0         | 0.0         |

INPLANE Z-PRI-O COORDINATE

REXOR DATA PAGE 34  
R/A PRG.SYMBOL DESCRIPTION

|     | AM-56A     | XH-51A     |
|-----|------------|------------|
| 901 | 0.0        | 0.0        |
| 902 | 0.0        | 0.0        |
| 903 | 0.0        | 0.0        |
| 904 | 0.0        | 0.0        |
| 905 | 0.0        | 0.0        |
| 906 | 0.0        | 0.0        |
| 907 | 0.0        | 0.0        |
| 908 | 0.0        | 0.0        |
| 909 | 0.0        | 0.0        |
| 910 | 0.0        | 0.0        |
| 911 | 0.0        | 0.0        |
| 912 | 0.0        | 0.0        |
| 913 | 0.0        | 0.0        |
| 914 | 0.0        | 0.0        |
| 915 | 0.0        | 0.0        |
| 916 | 0.0        | 0.0        |
| 917 | 0.0        | 0.0        |
| 918 | 0.0        | 0.0        |
| 919 | 0.0        | 0.0        |
| 920 | 0.0        | 0.0        |
| 921 | 0.0        | 0.0        |
| 922 | 9.8090E-05 | 0.0        |
| 923 | 1.4010E-03 | 9.0100E-04 |
| 924 | 2.7290E-03 | 2.9540E-03 |
| 925 | 4.4490E-03 | 4.9710E-03 |
| 926 | 7.5640E-03 | 7.1550E-03 |
| 927 | 1.0390E-02 | 8.5620E-03 |
| 928 | 1.3660E-02 | 9.8830E-03 |
| 929 | 1.8630E-02 | 1.1780E-02 |
| 930 | 2.3740E-02 | 1.3470E-02 |
| 931 | 2.9920E-02 | 1.4930E-02 |
| 932 | 3.2220E-02 | 1.6290E-02 |
| 933 | 3.6620E-02 | 1.7750E-02 |
| 934 | 0.0        | 0.0        |
| 935 | 0.0        | 0.0        |
| 936 | 0.0        | 0.0        |

921 HMS1F(40,4) 1ST.FLAP Y0 COORDINATE

REXOR DATA PAGE 35  
R/A PFG.SYMBOL DESCRIPTION

|     | AM-56A     | XH-51A     |
|-----|------------|------------|
| 937 | 0.0        | 0.0        |
| 938 | 0.0        | 0.0        |
| 939 | 0.0        | 0.0        |
| 940 | 0.0        | 0.0        |
| 941 | 0.0        | 0.0        |
| 942 | 0.0        | 0.0        |
| 943 | 0.0        | 0.0        |
| 944 | 0.0        | 0.0        |
| 945 | 0.0        | 0.0        |
| 946 | 0.0        | 0.0        |
| 947 | 0.0        | 0.0        |
| 948 | 0.0        | 0.0        |
| 949 | 0.0        | 0.0        |
| 950 | 0.0        | 0.0        |
| 951 | 0.0        | 0.0        |
| 952 | 0.0        | 0.0        |
| 953 | 0.0        | 0.0        |
| 954 | 0.0        | 0.0        |
| 955 | 0.0        | 0.0        |
| 956 | 0.0        | 0.0        |
| 957 | 0.0        | 0.0        |
| 958 | 0.0        | 0.0        |
| 959 | 0.0        | 0.0        |
| 960 | 0.0        | 0.0        |
| 961 | 0.0        | 0.0        |
| 962 | 1.6620E-02 | 0.0        |
| 963 | 1.0960E-01 | 1.3350E-01 |
| 964 | 1.7170E-01 | 2.5900E-01 |
| 965 | 2.3910E-01 | 3.6630E-01 |
| 966 | 3.3470E-01 | 4.7770E-01 |
| 967 | 4.0980E-01 | 5.4780E-01 |
| 968 | 4.9050E-01 | 6.1310E-01 |
| 969 | 6.0640E-01 | 7.0630E-01 |
| 970 | 7.2050E-01 | 7.8910E-01 |
| 971 | 8.5520E-01 | 8.6110E-01 |
| 972 | 9.0490E-01 | 9.2770E-01 |
| 973 | 1.0000E 00 | 1.0000E 00 |

1ST.FLAP 20 COORDINATE

REXOR DATA PAGE 36  
R/A PRG.SYMBOL DESCRIPTION

|      | AH-56A     | XH-51A     |
|------|------------|------------|
| 974  | 0.0        | 0.0        |
| 975  | 0.0        | 0.0        |
| 976  | 0.0        | 0.0        |
| 977  | 0.0        | 0.0        |
| 978  | 0.0        | 0.0        |
| 979  | 0.0        | 0.0        |
| 980  | 0.0        | 0.0        |
| 981  | 0.0        | 0.0        |
| 982  | 0.0        | 0.0        |
| 983  | 0.0        | 0.0        |
| 984  | 0.0        | 0.0        |
| 985  | 0.0        | 0.0        |
| 986  | 0.0        | 0.0        |
| 987  | 0.0        | 0.0        |
| 988  | 0.0        | 0.0        |
| 989  | 0.0        | 0.0        |
| 990  | 0.0        | 0.0        |
| 991  | 0.0        | 0.0        |
| 992  | 0.0        | 0.0        |
| 993  | 0.0        | 0.0        |
| 994  | 0.0        | 0.0        |
| 995  | 0.0        | 0.0        |
| 996  | 0.0        | 0.0        |
| 997  | 0.0        | 0.0        |
| 998  | 0.0        | 0.0        |
| 999  | 0.0        | 0.0        |
| 1000 | 0.0        | 0.0        |
| 1001 | 0.0        | 0.0        |
| 1002 | 0.0        | 0.0        |
| 1003 | 3.8620E-04 | 0.0        |
| 1004 | 7.2660E-04 | 5.9950E-04 |
| 1005 | 8.7340E-04 | 1.0770E-03 |
| 1006 | 1.1320E-03 | 1.2110E-03 |
| 1007 | 1.5110E-03 | 1.2830E-03 |
| 1008 | 1.7060E-03 | 1.3110E-03 |
| 1009 | 1.8590E-03 | 1.3300E-03 |
| 1010 | 1.9910E-03 | 1.3460E-03 |
|      | 2.0870E-03 | 1.3520E-03 |

1ST.FLAP Y-PRI-O COORDINATE



REXOR DATA PAGE 37  
R/A PPG.SYMBOL DESCRIPTION

|      | AM-56A     | XM-51A     |
|------|------------|------------|
| 1011 | 2.1400E-03 | 1.3540E-03 |
| 1012 | 2.1480E-03 | 1.3540E-03 |
| 1013 | 2.1530E-03 | 1.3540E-03 |
| 1014 | 0.0        | 0.0        |
| 1015 | 0.0        | 0.0        |
| 1016 | 0.0        | 0.0        |
| 1017 | 0.0        | 0.0        |
| 1018 | 0.0        | 0.0        |
| 1019 | 0.0        | 0.0        |
| 1020 | 0.0        | 0.0        |
| 1021 | 0.0        | 0.0        |
| 1022 | 0.0        | 0.0        |
| 1023 | 0.0        | 0.0        |
| 1024 | 0.0        | 0.0        |
| 1025 | 0.0        | 0.0        |
| 1026 | 0.0        | 0.0        |
| 1027 | 0.0        | 0.0        |
| 1028 | 0.0        | 0.0        |
| 1029 | 0.0        | 0.0        |
| 1030 | 0.0        | 0.0        |
| 1031 | 0.0        | 0.0        |
| 1032 | 0.0        | 0.0        |
| 1033 | 0.0        | 0.0        |
| 1034 | 0.0        | 0.0        |
| 1035 | 0.0        | 0.0        |
| 1036 | 0.0        | 0.0        |
| 1037 | 0.0        | 0.0        |
| 1038 | 0.0        | 0.0        |
| 1039 | 0.0        | 0.0        |
| 1040 | 0.0        | 0.0        |
| 1041 | 0.0        | 0.0        |
| 1042 | 3.5310E-02 | 0.0        |
| 1043 | 3.6900E-02 | 4.6270E-02 |
| 1044 | 3.7760E-02 | 5.9240E-02 |
| 1045 | 3.9550E-02 | 6.2820E-02 |
| 1046 | 4.2200E-02 | 6.4390E-02 |
| 1047 | 4.3500E-02 | 6.5020E-02 |

1ST.FLAP Z-PRI-O CCOORDINATE

REXOR DATA PAGE 38  
R/A PRG.SYMBOL DESCRIPTION

|      | AH-56A      | XH-51A      |
|------|-------------|-------------|
| 1048 | 4.4490E-02  | 6.5490E-02  |
| 1049 | 4.5300E-02  | 6.6030E-02  |
| 1050 | 4.5920E-02  | 6.6380E-02  |
| 1051 | 4.6350E-02  | 6.6580E-02  |
| 1052 | 4.6440E-02  | 6.6680E-02  |
| 1053 | 4.6490E-02  | 6.6700E-02  |
| 1054 | 0.0         | 0.0         |
| 1055 | 0.0         | 0.0         |
| 1056 | 0.0         | 0.0         |
| 1057 | 0.0         | 0.0         |
| 1058 | 0.0         | 0.0         |
| 1059 | 0.0         | 0.0         |
| 1060 | 0.0         | 0.0         |
| 1061 | 0.0         | 0.0         |
| 1062 | 0.0         | 0.0         |
| 1063 | 0.0         | 0.0         |
| 1064 | 0.0         | 0.0         |
| 1065 | 0.0         | 0.0         |
| 1066 | 0.0         | 0.0         |
| 1067 | 0.0         | 0.0         |
| 1068 | 0.0         | 0.0         |
| 1069 | 0.0         | 0.0         |
| 1070 | 0.0         | 0.0         |
| 1071 | 0.0         | 0.0         |
| 1072 | 0.0         | 0.0         |
| 1073 | 0.0         | 0.0         |
| 1074 | 0.0         | 0.0         |
| 1075 | 0.0         | 0.0         |
| 1076 | 0.0         | 0.0         |
| 1077 | 0.0         | 0.0         |
| 1078 | 0.0         | 0.0         |
| 1079 | 0.0         | 0.0         |
| 1080 | 0.0         | 0.0         |
| 1081 | 0.0         | 0.0         |
| 1082 | -1.2730E-03 | 0.0         |
| 1083 | -2.1340E-02 | -3.6770E-03 |

2ND.FLAP Y0 COORDINATE

REXOR DATA PAGE 39  
R/A PRG.SYMBOL DESCRIPTION

|      | AH-56A      | XH-51A      |
|------|-------------|-------------|
| 1084 | -3.8410E-02 | -6.7120E-03 |
| 1085 | -5.5440E-02 | -7.6600E-03 |
| 1086 | -7.3140E-02 | -7.6180E-03 |
| 1087 | -8.1530E-02 | -7.3390E-03 |
| 1088 | -8.4810E-02 | -7.0780E-03 |
| 1089 | -7.9650E-02 | -7.0060E-03 |
| 1090 | -6.3310E-02 | -7.4940E-03 |
| 1091 | -3.3060E-02 | -8.4170E-03 |
| 1092 | -1.9810E-02 | -9.6100E-03 |
| 1093 | 6.7830E-03  | -1.1080E-02 |
| 1094 | 0.0         | 0.0         |
| 1095 | 0.0         | 0.0         |
| 1096 | 0.0         | 0.0         |
| 1097 | 0.0         | 0.0         |
| 1098 | 0.0         | 0.0         |
| 1099 | 0.0         | 0.0         |
| 1100 | 0.0         | 0.0         |
| 1101 | 0.0         | 0.0         |
| 1102 | 0.0         | 0.0         |
| 1103 | 0.0         | 0.0         |
| 1104 | 0.0         | 0.0         |
| 1105 | 0.0         | 0.0         |
| 1106 | 0.0         | 0.0         |
| 1107 | 0.0         | 0.0         |
| 1108 | 0.0         | 0.0         |
| 1109 | 0.0         | 0.0         |
| 1110 | 0.0         | 0.0         |
| 1111 | 0.0         | 0.0         |
| 1112 | 0.0         | 0.0         |
| 1113 | 0.0         | 0.0         |
| 1114 | 0.0         | 0.0         |
| 1115 | 0.0         | 0.0         |
| 1116 | 0.0         | 0.0         |
| 1117 | 0.0         | 0.0         |
| 1118 | 0.0         | 0.0         |
| 1119 | 0.0         | 0.0         |
| 1120 | 0.0         | 0.0         |

REXOR DATA PAGE 40  
R/A PRG.SYMBOL DESCRIPTION

2ND.FLAP Z0 COORDINATE

|      | AH-56A      | XH-51A      |
|------|-------------|-------------|
| 1121 | 0.0         | 0.0         |
| 1122 | -5.5050E-02 | 0.0         |
| 1123 | -2.5510E-01 | -3.5300E-01 |
| 1124 | -3.8060E-01 | -5.5140E-01 |
| 1125 | -5.0000E-01 | -6.0950E-01 |
| 1126 | -6.0480E-01 | -5.6380E-01 |
| 1127 | -6.2820E-01 | -4.7650E-01 |
| 1128 | -5.8930E-01 | -3.5390E-01 |
| 1129 | -4.1990E-01 | -1.1240E-01 |
| 1130 | -1.1800E-01 | 1.6070E-01  |
| 1131 | 3.7540E-01  | 4.3240E-01  |
| 1132 | 5.8400E-01  | 7.0110E-01  |
| 1133 | 1.0000E 00  | 1.0000E 00  |
| 1134 | 0.0         | 0.0         |
| 1135 | 0.0         | 0.0         |
| 1136 | 0.0         | 0.0         |
| 1137 | 0.0         | 0.0         |
| 1138 | 0.0         | 0.0         |
| 1139 | 0.0         | 0.0         |
| 1140 | 0.0         | 0.0         |
| 1141 | 0.0         | 0.0         |
| 1142 | 0.0         | 0.0         |
| 1143 | 0.0         | 0.0         |
| 1144 | 0.0         | 0.0         |
| 1145 | 0.0         | 0.0         |
| 1146 | 0.0         | 0.0         |
| 1147 | 0.0         | 0.0         |
| 1148 | 0.0         | 0.0         |
| 1149 | 0.0         | 0.0         |
| 1150 | 0.0         | 0.0         |
| 1151 | 0.0         | 0.0         |
| 1152 | 0.0         | 0.0         |
| 1153 | 0.0         | 0.0         |
| 1154 | 0.0         | 0.0         |
| 1155 | 0.0         | 0.0         |
| 1156 | 0.0         | 0.0         |
| 1157 | 0.0         | 0.0         |

REXOR DATA PAGE 41  
R/A PRG.SYMBOL DESCRIPTION

| LINE | 2ND.FLAP Y-PRI-O | COORDINATE | AM-56A      | XM-51A      |
|------|------------------|------------|-------------|-------------|
| 1158 |                  |            | 0.0         | 0.0         |
| 1159 |                  |            | 0.0         | 0.0         |
| 1160 |                  |            | 0.0         | 0.0         |
| 1161 |                  |            | 0.0         | 0.0         |
| 1162 |                  |            | -0.5180E-03 | 0.0         |
| 1163 |                  |            | -0.9850E-03 | -1.5650E-03 |
| 1164 |                  |            | -1.0170E-02 | -8.8690E-04 |
| 1165 |                  |            | -8.9980E-03 | -2.0340E-04 |
| 1166 |                  |            | -6.0570E-03 | 2.2100E-04  |
| 1167 |                  |            | -3.4030E-03 | 2.9000E-04  |
| 1168 |                  |            | 4.0710E-06  | 2.0690E-04  |
| 1169 |                  |            | 4.4020E-03  | -1.4460E-04 |
| 1170 |                  |            | 8.4760E-03  | -6.2650E-04 |
| 1171 |                  |            | 1.1970E-02  | -1.0420E-03 |
| 1172 |                  |            | 1.2670E-02  | -1.2950E-03 |
| 1173 |                  |            | 1.3120E-02  | -1.3880E-03 |
| 1174 |                  |            | 0.0         | 0.0         |
| 1175 |                  |            | 0.0         | 0.0         |
| 1176 |                  |            | 0.0         | 0.0         |
| 1177 |                  |            | 0.0         | 0.0         |
| 1178 |                  |            | 0.0         | 0.0         |
| 1179 |                  |            | 0.0         | 0.0         |
| 1180 |                  |            | 0.0         | 0.0         |
| 1181 |                  |            | 0.0         | 0.0         |
| 1182 |                  |            | 0.0         | 0.0         |
| 1183 |                  |            | 0.0         | 0.0         |
| 1184 |                  |            | 0.0         | 0.0         |
| 1185 |                  |            | 0.0         | 0.0         |
| 1186 |                  |            | 0.0         | 0.0         |
| 1187 |                  |            | 0.0         | 0.0         |
| 1188 |                  |            | 0.0         | 0.0         |
| 1189 |                  |            | 0.0         | 0.0         |
| 1190 |                  |            | 0.0         | 0.0         |
| 1191 |                  |            | 0.0         | 0.0         |
| 1192 |                  |            | 0.0         | 0.0         |
| 1193 |                  |            | 0.0         | 0.0         |
| 1194 |                  |            | 0.0         | 0.0         |

REXOR DATA PAGE 42  
R/A PRG.SYMBOL DESCRIPTION

|      | AM-56A      | XH-51A      |
|------|-------------|-------------|
| 1195 | 0.0         | 0.0         |
| 1196 | 0.0         | 0.0         |
| 1197 | 0.0         | 0.0         |
| 1198 | 0.0         | 0.0         |
| 1199 | 0.0         | 0.0         |
| 1200 | 0.0         | 0.0         |
| 1201 | 0.0         | 0.0         |
| 1202 | 0.0         | 0.0         |
| 1203 | -7.7430E-02 | 0.0         |
| 1204 | -7.6470E-02 | -1.0270E-01 |
| 1205 | -7.3100E-02 | -5.9350E-02 |
| 1206 | -6.0280E-02 | -5.1800E-03 |
| 1207 | -2.7920E-02 | 5.9040E-02  |
| 1208 | 2.5260E-03  | 1.0230E-01  |
| 1209 | 4.1720E-02  | 1.4260E-01  |
| 1210 | 9.4270E-02  | 1.9710E-01  |
| 1211 | 1.4520E-01  | 2.3650E-01  |
| 1212 | 1.8950E-01  | 2.6170E-01  |
| 1213 | 1.9880E-01  | 2.7340E-01  |
| 1214 | 2.0500E-01  | 2.7710E-01  |
| 1215 | 0.0         | 0.0         |
| 1216 | 0.0         | 0.0         |
| 1217 | 0.0         | 0.0         |
| 1218 | 0.0         | 0.0         |
| 1219 | 0.0         | 0.0         |
| 1220 | 0.0         | 0.0         |
| 1221 | 0.0         | 0.0         |
| 1222 | 0.0         | 0.0         |
| 1223 | 0.0         | 0.0         |
| 1224 | 0.0         | 0.0         |
| 1225 | 0.0         | 0.0         |
| 1226 | 0.0         | 0.0         |
| 1227 | 0.0         | 0.0         |
| 1228 | 0.0         | 0.0         |
| 1229 | 0.0         | 0.0         |
| 1230 | 0.0         | 0.0         |
| 1231 | 0.0         | 0.0         |

2ND.FLAP 4-PRI-0 COORDINATE

REXOR DATA PAGE 43  
R/A PRG.SYMBOL DESCRIPTION

| REXOR DATA | PAGE       | DESCRIPTION                                      | AM-56A      | XH-51A      |
|------------|------------|--|-------------|-------------|
| 1232       |            |  | 0.0         | 0.0         |
| 1233       |            |  | 0.0         | 0.0         |
| 1234       |            |  | 0.0         | 0.0         |
| 1235       |            |  | 0.0         | 0.0         |
| 1236       |            |  | 0.0         | 0.0         |
| 1237       |            |  | 0.0         | 0.0         |
| 1238       |            |  | 0.0         | 0.0         |
| 1239       |            |  | 0.0         | 0.0         |
| 1240       |            |  | 0.0         | 0.0         |
| 1241       | HLADK(3,3) | BLADE STIFFNESS MATRIX<br>ELEMENTS K(1,1)-K(3,3) | 2.9870E 03  | 1.5300E 03  |
| 1242       |            |  | 3.4520E 01  | 3.8990E 00  |
| 1243       |            |  | -7.0790E 02 | -3.8490E 01 |
| 1244       |            |  | 3.4520E 01  | 3.8990E 00  |
| 1245       |            |  | 1.6260E 02  | 1.2510E 02  |
| 1246       |            |  | -3.4230E 02 | -2.8140E 02 |
| 1247       |            |  | -7.0790E 02 | -3.8490E 01 |
| 1248       |            |  | -3.4230E 02 | -2.8140E 02 |
| 1249       |            |  | 3.0150E 03  | 1.4520E 03  |
| 1250       | CTRIM      | BLADE MODE DAMPING<br>AFTER 1 SECOND OF TRIM     | 5.7000E-04  | 5.7000E-04  |
| 1251       | CFLY       | FLY DAMPING FACTOR                               | 5.7000E-04  | 5.7000E-04  |
| 1252       | CZERJ      | INITIAL DAMPING FACTOR                           | 3.0000E-02  | 1.0000E-02  |
| 1253       | CUVK       | K USED IN TAIL ROTOR                             | 1.0000E 00  | 1.0000E 00  |
| 1254       | OPEN       |  | 0.0         | 0.0         |
| 1255       |            |  | 0.0         | 0.0         |
| 1256       | DC4R       | INCREMENTAL BLADE CM FOR TAB                     | 0.0         | 0.0         |
| 1257       | IMAFLG     | FLAG FOR HARMONIC ANALYSIS<br>0=OFF,1=ON         | 0.0         | 0.0         |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>44 | DESCRIPTION                                 | AM-56A      | XM-51A     |
|------------------------------|------------|---|-------------|------------|
| 1258 SX8(4)                  |            | BLADE STA. FOR HARM. ANALYSIS               | 5.8200E 00  | 0.0        |
| 1259                         |            |   | 5.8300E 00  | 0.0        |
| 1260                         |            |   | 1.0910E 01  | 0.0        |
| 1261                         |            |   | 1.4400E 01  | 0.0        |
| 1262 IHAPLT                  |            | HARM.ANAL.PLOT FLAG,0-NONE                  | 2.0000E 00  | 2.0000E 00 |
| 1263 DGDHG                   |            | VERT-TO-ROTARY SWASHPLATE<br>DAMP. COUPLING | -1.0430E 00 | 0.0        |
| 1264 DELCD                   |            | ADJUSTMENT TO CD TABLES                     | 0.0         | 0.0        |
| 1265 WTCL                    |            | TOL. FOR WIMR CONVERGENCE                   | 0.0         | 0.0        |
| 1266 BETA                    |            | CONE ANGLE,DEG                              | 2.0000E 00  | 3.2000E 00 |
| 1267 TAJ                     |            | SWEEP ANGLE,DEG                             | 4.0000E 00  | 1.4000E 00 |
| 1268 GAMMA                   |            | DROCP ANGLE,DEG                             | 2.7800E 00  | 1.0000E 00 |
| 1269 PHIREF                  |            | REFERENCE FEATHEK ANGLE,DEG                 | 9.0000E 00  | 3.0000E 00 |
| 1270 RFAS                    |            | BLADE BEARING CONE ANGLE,DEG                | 2.3830E 00  | 3.2000E 00 |
| 1271 PTCL                    |            | TOL FOR PIMR CONVERGENCE                    | 0.0         | 0.0        |
| 1272 OTCL                    |            | TOL FOR OIMR CONVERGENCE                    | 0.0         | 0.0        |
| 1273 WITCL                   |            | TOL FOR WITR CONVERGENCE                    | 0.0         | 0.0        |
| 1274 K1                      |            | CONSTANTS FOR PERTURBATION<br>MODEL         | 0.0         | 0.0        |
| 1275 K2                      |            | CONSTANTS FOR PERTURBATION<br>MODEL         | 0.0         | 0.0        |
| 1276 GASTCP                  |            | GYRO STOP CONTACT ANGLE (SWP.)              | 1.0000E 03  | 1.0000E 03 |



| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>45 | DESCRIPTION  | AM-56A     | XH-51A     |
|------------------------------|------------|--|------------|------------|
| 1277 GKSTJP                  |            | GYRO STOP SPRING CONSTANT<br>(SLP.)                      | 1.0000E 03 | 1.0000E 03 |
| 1278 PPK                     |            | ROLL RATE CONSTANT                                       | 0.0        | 0.0        |
| 1279 TWTR                    |            | TAIL ROTOR WASHUP TIME                                   | 5.0000E 00 | 5.0000E 00 |
| 1280 TCTRA                   |            | TAIL ROTOR ACTUATOR TIME CONST                           | 3.5000E-02 | 3.5000E-02 |
| 1281 GRR0                    |            | AMCS,GEAR RATIO ROLL                                     | 0.0        | 0.0        |
| 1282 GRPO                    |            | AMCS,GEAR RATIO PITCH                                    | 0.0        | 0.0        |
| 1283 DGRKTH                  |            | AMCS,GEAR RATIO  | 0.0        | 0.0        |
| 1284 DGRPTH                  |            | AMCS,GEAR RATIO  | 0.0        | 0.0        |
| 1285 GBJRW                   |            | AMCS,GYRO BOB WEIGHT MOMENT                              | 0.0        | 0.0        |
| 1286 *****                   |            | NAT.FREQ.,RAD/SEC,WITH BLD.OTA<br>(INFC.ONLY) SFE RA(82) | 1.1500E 02 | 1.7000E 02 |
| 1287 THKTH                   |            | AMCS,CYCLIC STIFFNESS                                    | 0.0        | 0.0        |
| 1288 THKTWC                  |            | AMCS,COLLECTIVE STIFFNESS                                | 0.0        | 0.0        |
| 1289 C3F1                    |            | AMCS,83,SHAFT BENDING                                    | 0.0        | 0.0        |
| 1290 C3F2                    |            | AMCS,83,SHAFT BENDING                                    | 0.0        | 0.0        |
| 1291 SS                      |            | SPEED OF SOUND,FT/SEC                                    | 1.1440E 03 | 1.1300E 03 |
| 1292 TR42M                   |            | FLAG=1 TRIM TO SPEC. MOMENT<br>USE TRIMQ 1,2,3           | 0.0        | 0.0        |
| 1293 Z31I                    |            | AMCS,FEEDBACK PICKUP                                     | 0.0        | 0.0        |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>46 | DESCRIPTION                   | AM-56A     | XM-51A     |
|------------------------------|------------|-------------------------------|------------|------------|
| 1294 Z31F                    |            | AMCS, FEEDBACK PICKUP         | 0.0        | 0.0        |
| 1295 Z32F                    |            | AMCS, FEEDBACK PICKUP         | 0.0        | 0.0        |
| 1296 ZP31I                   |            | AMCS, FEEDBACK PICKUP         | 0.0        | 0.0        |
| 1297 ZP31F                   |            | AMCS, FEEDBACK PICKUP         | 0.0        | 0.0        |
| 1298 ZP32F                   |            | AMCS, FEEDBACK PICKUP         | 0.0        | 0.0        |
| 1299 BRKSH                   |            | AMCS, SHAFT BENDING STIFFNESS | 0.0        | 0.0        |
| 1300 IRLADE                  |            | BLADE AERO FLAG               | 3.0000E 00 | 3.0000E 00 |
| 1301 BI(40)                  |            | BLADE POLAR MOMENT OF INERTIA | 1.9450E-04 | 1.6200E-02 |
| 1302                         |            |                               | 2.6500E-02 | 3.1680E-02 |
| 1303                         |            |                               | 1.3610E-01 | 2.1210E-02 |
| 1304                         |            |                               | 3.6310E-01 | 1.6020E-02 |
| 1305                         |            |                               | 1.6880E-01 | 1.3220E-02 |
| 1306                         |            |                               | 1.0650E-01 | 1.1690E-02 |
| 1307                         |            |                               | 1.0040E-01 | 1.1750E-02 |
| 1308                         |            |                               | 8.6980E-02 | 1.1610E-02 |
| 1309                         |            |                               | 6.7310E-02 | 8.4480E-03 |
| 1310                         |            |                               | 6.4830E-02 | 1.1520E-02 |
| 1311                         |            |                               | 1.1660E-01 | 1.0320E-02 |
| 1312                         |            |                               | 7.1820E-02 | 8.9450E-03 |
| 1313                         |            |                               | 2.4440E-01 | 1.7090E-02 |
| 1314                         |            |                               | 0.0        | 0.0        |
| 1315                         |            |                               | 0.0        | 0.0        |
| 1316                         |            |                               | 0.0        | 0.0        |
| 1317                         |            |                               | 0.0        | 0.0        |
| 1318                         |            |                               | 0.0        | 0.0        |
| 1319                         |            |                               | 0.0        | 0.0        |
| 1320                         |            |                               | 0.0        | 0.0        |
| 1321                         |            |                               | 0.0        | 0.0        |
| 1322                         |            |                               | 0.0        | 0.0        |
| 1323                         |            |                               | 0.0        | 0.0        |

XH-51A

AH-56A

|      |          |            |             |
|------|----------|------------|-------------|
| 1324 |          | 0.0        | 0.0         |
| 1325 |          | 0.0        | 0.0         |
| 1326 |          | 0.0        | 0.0         |
| 1327 |          | 0.0        | 0.0         |
| 1328 |          | 0.0        | 0.0         |
| 1329 |          | 0.0        | 0.0         |
| 1330 |          | 0.0        | 0.0         |
| 1331 |          | 0.0        | 0.0         |
| 1332 |          | 0.0        | 0.0         |
| 1333 |          | 0.0        | 0.0         |
| 1334 |          | 0.0        | 0.0         |
| 1335 |          | 0.0        | 0.0         |
| 1336 |          | 0.0        | 0.0         |
| 1337 |          | 0.0        | 0.0         |
| 1338 |          | 0.0        | 0.0         |
| 1339 |          | 0.0        | 0.0         |
| 1340 |          | 0.0        | 0.0         |
| 1341 | DCJEF(4) | 1.0000E-01 | 1.0000E-01  |
| 1342 |          | 3.0000E-01 | 3.0000E-01  |
| 1343 |          | 3.0000E-01 | 3.0000E-01  |
| 1344 |          | 2.0000E-01 | 2.0000E-01  |
| 1345 | KTI      | 1.0000E 01 | 1.0000E 01  |
| 1346 | KTJ      | 1.1000E 01 | 1.1000E 01  |
| 1347 | DCYRI    | 1.0000E-02 | 0.0         |
| 1348 | HTI      | 0.0        | 3.0800E 00  |
| 1349 | YP       | 0.0        | -3.5800E 00 |
| 1350 | THRCJN   | 2.9364E 01 | 7.2000E 00  |
| 1351 | TORCJN   | 4.6663E 01 | 0.0         |

REXOR DATA PAGE 48  
R/A PRG-SYMBOL DESCRIPTION

1352 OPEN(9) OPEN

|      |            |            |
|------|------------|------------|
| 1353 | AM-56A     | XH-51A     |
| 1354 | 9.0020E-02 | 1.3000E-01 |
| 1355 | 0.0        | 0.0        |
| 1356 | 0.0        | 0.0        |
| 1357 | 0.0        | 0.0        |
| 1358 | 0.0        | 0.0        |
| 1359 | 0.0        | 0.0        |
| 1360 | 0.0        | 0.0        |

1361 DSGJ(40) BLADE TORSIONAL SPRING DATA

|      |            |            |
|------|------------|------------|
| 1362 | 0.0        | 0.0        |
| 1363 | 0.0        | 0.0        |
| 1364 | 0.0        | 1.1000E-05 |
| 1365 | 9.0000E-07 | 1.4000E-05 |
| 1366 | 1.1000E-06 | 2.0000E-05 |
| 1367 | 1.6000E-06 | 2.0000E-05 |
| 1368 | 1.9000E-06 | 2.0000E-05 |
| 1369 | 2.1000E-06 | 2.0000E-05 |
| 1370 | 2.4000E-06 | 2.0000E-05 |
| 1371 | 2.9000E-06 | 2.0000E-05 |
| 1372 | 3.7000E-06 | 2.0000E-05 |
| 1373 | 4.1000E-06 | 2.0000E-05 |
| 1374 | 5.0000E-06 | 2.0000E-05 |
| 1375 | 0.0        | 0.0        |
| 1376 | 0.0        | 0.0        |
| 1377 | 0.0        | 0.0        |
| 1378 | 0.0        | 0.0        |
| 1379 | 0.0        | 0.0        |
| 1380 | 0.0        | 0.0        |
| 1381 | 0.0        | 0.0        |
| 1382 | 0.0        | 0.0        |
| 1383 | 0.0        | 0.0        |
| 1384 | 0.0        | 0.0        |
| 1385 | 0.0        | 0.0        |
| 1386 | 0.0        | 0.0        |
| 1387 | 0.0        | 0.0        |

REXOR DATA PAGE 49  
R/A PRG.SYMBOL DESCRIPTION

|             |  |             |            |  |  |
|-------------|--|-------------|------------|--|--|
| 1388        |  |             |            |  |  |
| 1389        |  |             |            |  |  |
| 1390        |  |             |            |  |  |
| 1391        |  |             |            |  |  |
| 1392        |  |             |            |  |  |
| 1393        |  |             |            |  |  |
| 1394        |  |             |            |  |  |
| 1395        |  |             |            |  |  |
| 1396        |  |             |            |  |  |
| 1397        |  |             |            |  |  |
| 1398        |  |             |            |  |  |
| 1399        |  |             |            |  |  |
| 1400        |  |             |            |  |  |
| 1401 TCT    | STATIC TWIST NUMER. TIME CONST                     | 1.0000E-02  | 1.5000E-02 |  |  |
| 1402 DTH1   | BLADE ELASTIC TWIST DATA STA.1                     | 1.4000E 01  | 1.4000E 01 |  |  |
| 1403 DTH2   | BLADE ELASTIC TWIST DATA STA.2                     | 2.0000E 01  | 2.0000E 01 |  |  |
| 1404 TTFLAG | TTPACK FLAG IF 0. SKIP                             | 1.0000E 00  | 0.0        |  |  |
| 1405 CDR0   | BLADE ROOT DRAG COEF.                              | 2.5000E-02  | 2.5000E-02 |  |  |
| 1406 GAM2   | ANGLE BET. PITCH LINK PT. AND<br>FEATHER AXIS,AMCS | 0.0         | 0.0        |  |  |
| 1407 TC1(2) | AMCS, TIME CONSTANT                                | 0.0         | 0.0        |  |  |
| 1408        |  | 0.0         | 0.0        |  |  |
| 1409 YIV1   | PARTIALS FOR TT PACK                               | 1.0000E-04  | 0.0        |  |  |
| 1410 YIV2   | PARTIALS FOR TT PACK                               | 0.0         | 0.0        |  |  |
| 1411 YIV3   | PARTIALS FOR TT PACK                               | 0.0         | 0.0        |  |  |
| 1412 ZIV1   | PARTIALS FOR TT PACK                               | -1.0000E-04 | 0.0        |  |  |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>50 | DESCRIPTION                          | AM-56A      | XH-51A     |
|------------------------------|------------|--------------------------------------|-------------|------------|
| 1413 ZIV2                    |            | PARTIALS FOR TT PACK                 | 9.0000E-04  | 0.0        |
| 1414 ZIV3                    |            | PARTIALS FOR TT PACK                 | -3.0000E-03 | 0.0        |
| 1415 YOV1                    |            | PARTIALS FOR TT PACK                 | 3.0000E-03  | 0.0        |
| 1416 YOV2                    |            | PARTIALS FOR TT PACK                 | 1.0000E-04  | 0.0        |
| 1417 YOV3                    |            | PARTIALS FOR TT PACK                 | -7.0000E-04 | 0.0        |
| 1418 ZOV1                    |            | PARTIALS FOR TT PACK                 | -1.3000E-03 | 0.0        |
| 1419 ZOV2                    |            | PARTIALS FOR TT PACK                 | 1.5000E-02  | 0.0        |
| 1420 ZOV3                    |            | PARTIALS FOR TT PACK                 | -5.1300E-02 | 0.0        |
| 1421 YSC(40)                 |            | BLADE SHEAR CENTER CHORDWISE<br>POS. | 0.0         | 0.0        |
| 1422                         |            |                                      | -4.0000E-01 | 0.0        |
| 1423                         |            |                                      | -4.3000E-01 | 1.4000E-01 |
| 1424                         |            |                                      | 1.0000E-01  | 1.4000E-01 |
| 1425                         |            |                                      | 2.0000E-01  | 1.4000E-01 |
| 1426                         |            |                                      | 2.1000E-01  | 1.4000E-01 |
| 1427                         |            |                                      | 2.0000E-01  | 1.4000E-01 |
| 1428                         |            |                                      | 1.9000E-01  | 1.4000E-01 |
| 1429                         |            |                                      | 1.7000E-01  | 1.4000E-01 |
| 1430                         |            |                                      | 1.4000E-01  | 1.4000E-01 |
| 1431                         |            |                                      | 1.2000E-01  | 1.4000E-01 |
| 1432                         |            |                                      | 1.0000E-01  | 1.4000E-01 |
| 1433                         |            |                                      | 1.0000E-01  | 1.4000E-01 |
| 1434                         |            |                                      | 0.0         | 0.0        |
| 1435                         |            |                                      | 0.0         | 0.0        |
| 1436                         |            |                                      | 0.0         | 0.0        |
| 1437                         |            |                                      | 0.0         | 0.0        |
| 1438                         |            |                                      | 0.0         | 0.0        |
| 1439                         |            |                                      | 0.0         | 0.0        |
| 1440                         |            |                                      | 0.0         | 0.0        |

REXOR DATA PAGE 51  
R/A PRG.SYMBOL DESCRIPTION

|           | AH-56A     | XH-51A     |
|-----------|------------|------------|
| 1441      | 0.0        | 0.0        |
| 1442      | 0.0        | 0.0        |
| 1443      | 0.0        | 0.0        |
| 1444      | 0.0        | 0.0        |
| 1445      | 0.0        | 0.0        |
| 1446      | 0.0        | 0.0        |
| 1447      | 0.0        | 0.0        |
| 1448      | 0.0        | 0.0        |
| 1449      | 0.0        | 0.0        |
| 1450      | 0.0        | 0.0        |
| 1451      | 0.0        | 0.0        |
| 1452      | 0.0        | 0.0        |
| 1453      | 0.0        | 0.0        |
| 1454      | 0.0        | 0.0        |
| 1455      | 0.0        | 0.0        |
| 1456      | 0.0        | 0.0        |
| 1457      | 0.0        | 0.0        |
| 1458      | 0.0        | 0.0        |
| 1459      | 0.0        | 0.0        |
| 1460      | 0.0        | 0.0        |
| 1461 IXXF | 6.0000E 03 | 1.0000E 03 |
| 1462 IYVF | 5.3300E 04 | 2.6800E 03 |
| 1463 IZZF | 5.1900E 04 | 2.8000E 03 |
| 1464 IXYF | 1.1460E 03 | 0.0        |
| 1465 IXZF | 1.6270E 03 | 0.0        |
| 1466 IYZF | 5.2900E 01 | 0.0        |
| 1467 IEJU | 2.5060E 03 | 0.0        |

FUSE, MOM. INERTIA, ROLL  
FUSE, MOM. INERTIA, PITCH  
FUSE, MOM. INERTIA, YAW  
FUSE, PROD. OF MOM. INERTIA,  
ROLL-PITCH  
FUSE, PROD. OF MOM. INERTIA,  
ROLL-YAW  
FUSE, PROD. OF MOM. INERTIA,  
PITCH-YAW  
MISC. MOM. INERTIA ABOUT ZZ-AXIS

| REXOR DATA<br>R/A PRG-SYMBOL | PAGE<br>52 | DESCRIPTION   | AM-56A      | XH-51A      |
|------------------------------|------------|---|-------------|-------------|
| 1468 IZZH                    |            | IZZH A HUB.MOM.INERTIA ABOUT<br>ZZ-AXIS             | 2.1000E 02  | 1.4900E 01  |
| 1469 ZGS                     |            | GYRO C.G. IN Z DTR., ROTOR SYS.<br>(SWP.)           | -1.3300E 00 | -6.3000E-01 |
| 1470 IXXPRD                  |            | PROP.MOM.INERTIA ABOUT XX-AXIS<br>(ALSO PROP. FLAG) | 1.3980E 01  | 1.0000E 00  |
| 1471 IXXENG                  |            | ENG.MOM.INERTIA ABOUT XX-AXIS                       | 5.6700E-01  | 6.1000E-02  |
| 1472 IWYTR                   |            | TAIL ROTOR MOM.INERTIA ABOUT<br>XY-AXIS             | 1.2600E 01  | 6.6000E-01  |
| 1473 GRPRO                   |            | GEAR RATIO,PROP.                                    | 7.0000E 00  | 4.8500E 00  |
| 1474 GRENG                   |            | GEAR RATIO,ENG.                                     | 5.5300E 01  | 1.0200E 02  |
| 1475 GRT2                    |            | GEAR RATIO,TAIL ROTOR                               | 5.2500E 00  | 5.8700E 00  |
| 1476 GAINEN                  |            | GAIN,ENG.   | 4.1200E 03  | 0.0         |
| 1477 ZBPH                    |            | PITCH HORN ARM OFFSET                               | 1.0000E 00  | 0.0         |
| 1478 AKPH                    |            | PITCH HORN SPRING CONST.                            | 4.2500E 04  | 0.0         |
| 1479 DELZDR                  |            | OUTBOARD BEARING OFFSET ADJ.                        | -4.5000E-03 | 0.0         |
| 1480 IPHDRN                  |            | FLAG FOR PITCH HORN<br>O=OFF,1=ON                   | 1.0000E 00  | 0.0         |
| 1481 SKIPIN                  |            | SKIP N MATRIX INVERSIONS                            | 0.0         | 9.5600E-02  |
| 1482 ZJCG                    |            | BLADE JOG REQUIRED BY REXOR<br>GEOMETRY             | -1.8200E-02 | 0.0         |
| 1483 IFFT                    |            | FAST FOURIER TRANSFORM FLAG                         | 0.0         | 0.0         |



| REXUR DATA<br>P/A PEG.SYMBOL | PAGE<br>53 | DESCRIPTION                                      | AH-56A     | XH-51A     |
|------------------------------|------------|--|------------|------------|
| 1484 ENHXPX                  |            | MAX.HORSEPOWER WITH ENG. D.O.F                   | 3.8000E 03 | 1.0000E 05 |
| 1485 CFB                     |            | FEATHERING VISCOUS FRICTION                      | 5.5000E 01 | 0.0        |
| 1486 WICCN                   |            | CONST. MULTIPLIER ON WIMRN                       | 1.0000E 00 | 0.0        |
| 1487 KPH                     |            | SPRING ONLY USED WITH PSEUDJ<br>PITCH HORN D.O.F | 0.0        | 0.0        |
| 1488 TPH                     |            | TIME CONST. USED WITH PSEUDJ<br>PITCH HORN D.O.F | 0.0        | 0.0        |
| 1489 K1D                     |            | CONSTANTS FOR INTERNALLY GENE-<br>RATING 2       | 0.0        | 0.0        |
| 1490 K2D                     |            | CONSTANTS FOR INTERNALLY GENE-<br>RATING 2       | 0.0        | 0.0        |
| 1491 RTWANG(3)               |            | REACTIONLESS INPLANE EXCITATN                    | 0.0        | 0.0        |
| 1492                         |            |  | 0.0        | 0.0        |
| 1493                         |            |  | 0.0        | 0.0        |
| 1494 FIDDLE                  |            | COLLECTIVE CONTROL LOAD ADJMNT                   | 0.0        | 0.0        |
| 1495 FLOQUE                  |            | FLOQUET ANALYSIS FLAG<br>0=OFF,1=ON              | 0.0        | 0.0        |
| 1496 AZFL                    |            | INCREMENT FOR FLOQUET ANALYSIS                   | 0.0        | 0.0        |
| 1497 TORFLG                  |            | TORSION FLAG                                     | 1.0000E 00 | 0.0        |
| 1498 TSTOP                   |            | MAX. FLY TIME                                    | 2.7000E 00 | 4.2500E 00 |
| 1499 IDECUP                  |            | DECOUPLER FLAG                                   | 0.0        | 0.0        |
| 1500 IUN                     |            | FLAG FOR RA(1501-1660)                           | 0.0        | 0.0        |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>54 | DESCRIPTION                                     | AH-56A | XH-51A |
|------------------------------|------------|---|--------|--------|
| 1501 YTB(20)                 |            | THETA TABLE - USE IN<br>CONJUNCTION WITH PT(20) | 0.0    | 0.0    |
| 1502                         |            |   | 0.0    | 0.0    |
| 1503                         |            |   | 0.0    | 0.0    |
| 1504                         |            |   | 0.0    | 0.0    |
| 1505                         |            |   | 0.0    | 0.0    |
| 1506                         |            |   | 0.0    | 0.0    |
| 1507                         |            |   | 0.0    | 0.0    |
| 1508                         |            |   | 0.0    | 0.0    |
| 1509                         |            |   | 0.0    | 0.0    |
| 1510                         |            |   | 0.0    | 0.0    |
| 1511                         |            |   | 0.0    | 0.0    |
| 1512                         |            |   | 0.0    | 0.0    |
| 1513                         |            |   | 0.0    | 0.0    |
| 1514                         |            |   | 0.0    | 0.0    |
| 1515                         |            |   | 0.0    | 0.0    |
| 1516                         |            |   | 0.0    | 0.0    |
| 1517                         |            |   | 0.0    | 0.0    |
| 1518                         |            |   | 0.0    | 0.0    |
| 1519                         |            |   | 0.0    | 0.0    |
| 1520                         |            |   | 0.0    | 0.0    |
| 1521 OPEN(140)               |            | OPEN  | 0.0    | 0.0    |
| 1522                         |            |   | 0.0    | 0.0    |
| 1523                         |            |   | 0.0    | 0.0    |
| 1524                         |            |   | 0.0    | 0.0    |
| 1525                         |            |   | 0.0    | 0.0    |
| 1526                         |            |   | 0.0    | 0.0    |
| 1527                         |            |   | 0.0    | 0.0    |
| 1528                         |            |   | 0.0    | 0.0    |
| 1529                         |            |   | 0.0    | 0.0    |
| 1530                         |            |   | 0.0    | 0.0    |
| 1531                         |            |   | 0.0    | 0.0    |
| 1532                         |            |   | 0.0    | 0.0    |
| 1533                         |            |   | 0.0    | 0.0    |
| 1534                         |            |   | 0.0    | 0.0    |
| 1535                         |            |   | 0.0    | 0.0    |

**AH-56A**

REXDR DATA PAGE 56  
R/A PRG.SYMBOL DESCRIPTION

XH-51A

AH-56A

|      |     |
|------|-----|
| 1573 | 0.0 |
| 1574 | 0.0 |
| 1575 | 0.0 |
| 1576 | 0.0 |
| 1577 | 0.0 |
| 1578 | 0.0 |
| 1579 | 0.0 |
| 1580 | 0.0 |
| 1581 | 0.0 |
| 1582 | 0.0 |
| 1583 | 0.0 |
| 1584 | 0.0 |
| 1585 | 0.0 |
| 1586 | 0.0 |
| 1587 | 0.0 |
| 1588 | 0.0 |
| 1589 | 0.0 |
| 1590 | 0.0 |
| 1591 | 0.0 |
| 1592 | 0.0 |
| 1593 | 0.0 |
| 1594 | 0.0 |
| 1595 | 0.0 |
| 1596 | 0.0 |
| 1597 | 0.0 |
| 1598 | 0.0 |
| 1599 | 0.0 |
| 1600 | 0.0 |
| 1601 | 0.0 |
| 1602 | 0.0 |
| 1603 | 0.0 |
| 1604 | 0.0 |
| 1605 | 0.0 |
| 1606 | 0.0 |
| 1607 | 0.0 |
| 1608 | 0.0 |
| 1609 | 0.0 |



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**PAGE**

REXOR DATA  
R/A PRG.SYMBOL

**XH-51A**

**AH-56A**

1647  
1648  
1649  
1650  
1651  
1652  
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1654  
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1656  
1657  
1658  
1659  
1660

DISPL. EACH D.C.F.

Y(30)

| V(30) | DISPL. EACH D.C.F. |
|-------|--------------------|
| 1661  | 3.9043E-02         |
| 1662  | 1.3719E-01         |
| 1663  | 2.8601E-02         |
| 1664  | 0.0                |
| 1665  | -2.0854E-03        |
| 1666  | 4.0150E-01         |
| 1667  | 1.0647E-01         |
| 1668  | 0.0                |
| 1669  | 3.4854E-02         |
| 1670  | 7.3920E-01         |
| 1671  | 4.4026E-02         |
| 1672  | 0.0                |
| 1673  | 8.6136E-02         |
| 1674  | 3.1388E-01         |
| 1675  | 9.2961E-03         |
| 1676  | 0.0                |
| 1677  | 8.5754E-03         |
| 1678  | -6.0389E-02        |
| 1679  | 5.8420E-03         |
| 1680  | 0.0                |
| 1681  | 2.4751E 02         |
| 1682  | 0.0                |

REXOK DATA PAGE 59  
R/A PRG.SY4BOL DESCRIPTION

|      | AM-56A | AM-51A      |
|------|--------|-------------|
| 1683 | 0.0    | 1.5624E 01  |
| 1684 | 0.0    | 0.0         |
| 1685 | 0.0    | 0.0         |
| 1686 | 0.0    | 0.0         |
| 1687 | 0.0    | -1.1973E-02 |
| 1688 | 0.0    | 6.3036E-02  |
| 1689 | 0.0    | 0.0         |
| 1690 | 0.0    | 0.0         |
| 1691 | 0.0    | -1.9171E 00 |
| 1692 | 0.0    | 3.2421E 00  |
| 1693 | 0.0    | -7.6593E-01 |
| 1694 | 0.0    | 0.0         |
| 1695 | 0.0    | 5.2080E-01  |
| 1696 | 0.0    | 9.7551E 00  |
| 1697 | 0.0    | 1.0371E 00  |
| 1698 | 0.0    | 0.0         |
| 1699 | 0.0    | 1.3351E 00  |
| 1700 | 0.0    | -1.0569E 00 |
| 1701 | 0.0    | -2.4338E 00 |
| 1702 | 0.0    | 0.0         |
| 1703 | 0.0    | 1.6908E-01  |
| 1704 | 0.0    | -1.2079E 01 |
| 1705 | 0.0    | 2.0085E 00  |
| 1706 | 0.0    | 0.0         |
| 1707 | 0.0    | 0.0         |
| 1708 | 0.0    | 0.0         |
| 1709 | 0.0    | 0.0         |
| 1710 | 0.0    | 3.6740E 01  |
| 1711 | 0.0    | -2.0463E-01 |
| 1712 | 0.0    | -1.9085E-01 |
| 1713 | 0.0    | -1.0500E-01 |
| 1714 | 0.0    | -1.1011E-01 |
| 1715 | 0.0    | 3.5384E-02  |
| 1716 | 0.0    | -2.0891E-02 |
| 1717 | 0.0    | 0.0         |
| 1718 | 0.0    | 0.0         |

VEL. EACH D.O.F.

VD(30)

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>60 | DESCRIPTION   | AM-56A      | XH-51A      |
|------------------------------|------------|---|-------------|-------------|
| 1719                         |            |   | 0.0         | 0.0         |
| 1720                         |            |   | 0.0         | 0.0         |
| 1721                         | YDC(30)    | ACC. EACH D.O.F.  | 0.0         | -1.7476E 01 |
| 1722                         |            |   | 0.0         | 2.2154E 02  |
| 1723                         |            |   | 0.0         | 1.0472E 02  |
| 1724                         |            |   | 0.0         | 0.0         |
| 1725                         |            |   | 0.0         | 4.5140E 01  |
| 1726                         |            |   | 0.0         | 2.0793E 02  |
| 1727                         |            |   | 0.0         | -1.9724E 02 |
| 1728                         |            |   | 0.0         | 0.0         |
| 1729                         |            |   | 0.0         | 2.7472E 01  |
| 1730                         |            |   | 0.0         | -6.3628E 02 |
| 1731                         |            |   | 0.0         | -1.5304E 00 |
| 1732                         |            |   | 0.0         | 0.0         |
| 1733                         |            |   | 0.0         | -8.4752E 01 |
| 1734                         |            |   | 0.0         | 2.1893E 02  |
| 1735                         |            |   | 0.0         | 8.4705E 01  |
| 1736                         |            |   | 0.0         | 0.0         |
| 1737                         |            |   | 0.0         | 2.4137E 00  |
| 1738                         |            |   | 0.0         | -4.1303E-02 |
| 1739                         |            |   | 0.0         | 2.0484E 00  |
| 1740                         |            |   | 0.0         | 0.0         |
| 1741                         |            |   | 0.0         | 1.8238E 00  |
| 1742                         |            |   | 0.0         | 1.9389E-01  |
| 1743                         |            |   | 0.0         | -3.2239E 01 |
| 1744                         |            |   | 0.0         | -1.1011E-01 |
| 1745                         |            |   | 0.0         | 3.5384E-02  |
| 1746                         |            |   | 0.0         | -2.0891E-02 |
| 1747                         |            |   | 0.0         | 0.0         |
| 1748                         |            |   | 0.0         | 0.0         |
| 1749                         |            |   | 0.0         | 0.0         |
| 1750                         |            |   | 0.0         | 0.0         |
| 1751                         | EXTN(25,2) | AEFUDYNAMIC INTERFERENCE FACTR<br>MAINROTOR-TO-FIXED SURFACES | 1.8000E 01  | 1.8000E 01  |
| 1752                         |            |   | -1.8000E 02 | -1.8000E 02 |



PEXOR DATA PAGE 61  
R/A PRG.SYMBOL DESCRIPTION

|      | AH-56A      | XH-51A      |
|------|-------------|-------------|
| 1753 | 6.2300E-01  | 6.2300E-01  |
| 1754 | 0.0         | 0.0         |
| 1755 | 6.2300E-01  | 6.2300E-01  |
| 1756 | 4.0000E 01  | 4.0000E 01  |
| 1757 | 7.4000E-01  | 7.4000E-01  |
| 1758 | 7.0000E 01  | 7.0000E 01  |
| 1759 | 8.8000E-01  | 8.8000E-01  |
| 1760 | 8.0000E 01  | 8.0000E 01  |
| 1761 | 8.6000E-01  | 8.6000E-01  |
| 1762 | 9.0000E 01  | 9.0000E 01  |
| 1763 | 8.4000E-01  | 8.4000E-01  |
| 1764 | 1.0000E 02  | 1.0000E 02  |
| 1765 | 5.6000E-01  | 5.6000E-01  |
| 1766 | 1.1000E 02  | 1.1000E 02  |
| 1767 | 3.8300E-01  | 3.8300E-01  |
| 1768 | 1.8000E 02  | 1.8000E 02  |
| 1769 | 3.8300E-01  | 3.8300E-01  |
| 1770 | 0.0         | 0.0         |
| 1771 | 0.0         | 0.0         |
| 1772 | 0.0         | 0.0         |
| 1773 | 0.0         | 0.0         |
| 1774 | 0.0         | 0.0         |
| 1775 | 0.0         | 0.0         |
| 1776 | 2.2000E 01  | 1.4000E 01  |
| 1777 | -1.8000E 02 | -1.8000E 02 |
| 1778 | 0.0         | 4.0000E-01  |
| 1779 | 2.0000E 01  | -5.0000E 00 |
| 1780 | 0.0         | 4.0000E-01  |
| 1781 | 5.0000E 01  | 0.0         |
| 1782 | 2.0000E 00  | 5.0000E-01  |
| 1783 | 6.0000E 01  | 7.0000E 01  |
| 1784 | 1.9200E 00  | 1.9000E 00  |
| 1785 | 7.4000E 01  | 9.0000E 01  |
| 1786 | 1.5200E 00  | 1.0000E 00  |
| 1787 | 8.0000E 01  | 1.2000E 02  |
| 1788 | 1.3400E 00  | 4.0000E-01  |
| 1789 | 9.0000E 01  | 1.8000E 02  |

REXNR DATA PAGE 62  
R/A PKG.SYMBOL DESCRIPTION

|                | AH-56A     | XH-51A     |
|----------------|------------|------------|
| 1790           | 1.1400E 00 | 4.0000E-01 |
| 1791           | 1.0000E 02 | 0.0        |
| 1792           | 1.0800E 00 | 0.0        |
| 1793           | 1.1000E 02 | 0.0        |
| 1794           | 1.0400E 00 | 0.0        |
| 1795           | 1.2000E 02 | 0.0        |
| 1796           | 9.6000E-01 | 0.0        |
| 1797           | 1.8000E 02 | 0.0        |
| 1798           | 0.0        | 0.0        |
| 1799           | 0.0        | 0.0        |
| 1800           | 0.0        | 0.0        |
| 1801 NVEC2(50) | 3.0000E 00 | 3.0000E 00 |
| 1802           | 1.6000E 01 | 1.6000E 01 |
| 1803           | 2.1000E 01 | 2.1000E 01 |
| 1804           | 1.7000E 01 | 1.7000E 01 |
| 1805           | 2.3000E 01 | 2.3000E 01 |
| 1806           | 2.4000E 01 | 2.4000E 01 |
| 1807           | 2.5000E 01 | 2.5000E 01 |
| 1808           | 3.0000E 01 | 3.0000E 01 |
| 1809           | 2.9000E 01 | 2.9000E 01 |
| 1810           | 2.6000E 01 | 2.6000E 01 |
| 1811           | 2.7000E 01 | 2.7000E 01 |
| 1812           | 2.8000E 01 | 2.8000E 01 |
| 1813           | 1.4000E 01 | 1.4000E 01 |
| 1814           | 1.5000E 01 | 1.5000E 01 |
| 1815           | 1.9000E 01 | 1.9000E 01 |
| 1816           | 7.0000E 00 | 7.0000E 00 |
| 1817           | 5.4000E 01 | 5.4000E 01 |
| 1818           | 4.0000E 00 | 4.0000E 00 |
| 1819           | 4.2000E 01 | 4.2000E 01 |
| 1820           | 4.8000E 01 | 4.8000E 01 |
| 1821           | 5.1000E 01 | 5.1000E 01 |
| 1822           | 5.2000E 01 | 5.2000E 01 |
| 1823           | 4.7000E 01 | 4.7000E 01 |
| 1824           | 5.6000E 01 | 5.6000E 01 |
| 1825           | 1.8000E 01 | 1.8000E 01 |

FLY PLOT CODE TABLE

PFOR DATA PAGE 63  
W/A PRG.SYMBOL DESCRIPTION

|      | AM-56A     | XH-51A     |
|------|------------|------------|
| 1826 | 1.0000E 00 | 1.0000E 00 |
| 1827 | 8.0000E 00 | 8.0000E 00 |
| 1828 | 9.0000E 00 | 9.0000E 00 |
| 1829 | 3.1000E 01 | 1.0000E 01 |
| 1830 | 3.2000E 01 | 1.1000E 01 |
| 1831 | 3.3000E 01 | 3.3000E 01 |
| 1832 | 3.4000E 01 | 3.4000E 01 |
| 1833 | 3.7000E 01 | 3.7000E 01 |
| 1834 | 3.8000E 01 | 3.8000E 01 |
| 1835 | 3.9000E 01 | 3.9000E 01 |
| 1836 | 4.0000E 01 | 4.0000E 01 |
| 1837 | 4.1000E 01 | 4.1000E 01 |
| 1838 | 4.3000E 01 | 4.3000E 01 |
| 1839 | 4.4000E 01 | 4.4000E 01 |
| 1840 | 4.5000E 01 | 4.5000E 01 |
| 1841 | 0.0        | 0.0        |
| 1842 | 0.0        | 0.0        |
| 1843 | 0.0        | 0.0        |
| 1844 | 0.0        | 0.0        |
| 1845 | 0.0        | 0.0        |
| 1846 | 0.0        | 0.0        |
| 1847 | 0.0        | 0.0        |
| 1848 | 0.0        | 0.0        |
| 1849 | 0.0        | 0.0        |
| 1850 | 0.0        | 0.0        |
| 1851 | 0.0        | 0.0        |
| 1852 | 0.0        | 0.0        |
| 1853 | 0.0        | 0.0        |
| 1854 | 0.0        | 0.0        |
| 1855 | 0.0        | 0.0        |
| 1856 | 0.0        | 0.0        |
| 1857 | 0.0        | 0.0        |
| 1858 | 0.0        | 0.0        |
| 1859 | 0.0        | 0.0        |
| 1860 | 0.0        | 0.0        |
| 1861 | 0.0        | 0.0        |

TABLE OF PLOT SCALE FACTORS

SVEC(50)

**REXOR DATA P**

REXON DATA  
R/A PRG.SYMBOL

## AUTO-PILOT SETTINGS

0000

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>66 | DESCRIPTION                 | AM-56A | XM-51A |
|------------------------------|------------|-----------------------------|--------|--------|
| 1935                         |            |                             | 0.0    | 0.0    |
| 1936                         | MPSET      | SET HORSEPOWER IN AUTOPILOT | 0.0    | 0.0    |
| 1937                         | OPEN(2)    | OPEN                        | 0.0    | 0.0    |
| 1938                         |            |                             | 0.0    | 0.0    |
| 1939                         | TMAUTO     | TIME TO START AUTO          | 0.0    | 0.0    |
| 1940                         | NPT        | NOT USED                    | 0.0    | 0.0    |
| 1941                         | ***** (40) | AUTO PILOT INPUTS           | 0.0    | 0.0    |
| 1942                         |            |                             | 0.0    | 0.0    |
| 1943                         |            |                             | 0.0    | 0.0    |
| 1944                         |            |                             | 0.0    | 0.0    |
| 1945                         |            |                             | 0.0    | 0.0    |
| 1946                         |            |                             | 0.0    | 0.0    |
| 1947                         |            |                             | 0.0    | 0.0    |
| 1948                         |            |                             | 0.0    | 0.0    |
| 1949                         |            |                             | 0.0    | 0.0    |
| 1950                         |            |                             | 0.0    | 0.0    |
| 1951                         |            |                             | 0.0    | 0.0    |
| 1952                         |            |                             | 0.0    | 0.0    |
| 1953                         |            |                             | 0.0    | 0.0    |
| 1954                         |            |                             | 0.0    | 0.0    |
| 1955                         |            |                             | 0.0    | 0.0    |
| 1956                         |            |                             | 0.0    | 0.0    |
| 1957                         |            |                             | 0.0    | 0.0    |
| 1958                         |            |                             | 0.0    | 0.0    |
| 1959                         |            |                             | 0.0    | 0.0    |
| 1960                         |            |                             | 0.0    | 0.0    |
| 1961                         |            |                             | 0.0    | 0.0    |
| 1962                         |            |                             | 0.0    | 0.0    |
| 1963                         |            |                             | 0.0    | 0.0    |
| 1964                         |            |                             | 0.0    | 0.0    |
| 1965                         |            |                             | 0.0    | 0.0    |
| 1966                         |            |                             | 0.0    | 0.0    |

REXOR DATA PAGE 67  
R/A PRG.SYMBOL DESCRIPTION

|      | AM-56A      | XM-51A      |
|------|-------------|-------------|
| 1967 | 0.0         | 0.0         |
| 1968 | 0.0         | 0.0         |
| 1969 | 0.0         | 0.0         |
| 1970 | 0.0         | 0.0         |
| 1971 | 0.0         | 0.0         |
| 1972 | 0.0         | 0.0         |
| 1973 | 0.0         | 0.0         |
| 1974 | 0.0         | 0.0         |
| 1975 | 0.0         | 0.0         |
| 1976 | 0.0         | 0.0         |
| 1977 | 0.0         | 0.0         |
| 1978 | 0.0         | 0.0         |
| 1979 | 0.0         | 0.0         |
| 1980 | 0.0         | 0.0         |
| 1981 | 1.0000E-02  | 5.0000E-03  |
| 1982 | 1.0000E-02  | 5.0000E-03  |
| 1983 | -4.0000E-04 | -2.0000E-04 |
| 1984 | 8.0000E-04  | 4.0000E-04  |
| 1985 | -5.0000E-03 | -1.0000E-03 |
| 1986 | -5.0000E-02 | -1.0000E-02 |
| 1987 | 2.0000E 00  | 5.0000E-01  |
| 1988 | -2.5000E-04 | -1.0000E-04 |
| 1989 | 5.0000E 02  | 0.0         |
| 1990 | -2.5000E-04 | 0.0         |
| 1991 | 3.0000E 00  | 0.0         |
| 1992 | 3.0000E-05  | 0.0         |
| 1993 | 3.3400E-01  | 0.0         |
| 1994 | 2.0000E 00  | 5.0000E-01  |
| 1995 | 0.0         | 0.0         |
| 1996 | 0.0         | 0.0         |
| 1997 | 0.0         | 0.0         |
| 1998 | 0.0         | 0.0         |
| 1999 | 0.0         | 0.0         |

1981 GAIN(20)  
 1982 TRIM GAIN ON BP  
 1983 TRIM GAIN ON PHI  
 1984 TRIM GAIN ON THO OF ALPHA  
 1985 TRIM GAIN ON AIS  
 1986 TRIM GAIN ON BIS  
 1987 TRIM GAIN ON THOTR  
 1988 TRIM GAIN ON GLCON  
 1989 TRIM GAIN ON ZG  
 1990 TRIM GAIN ON ENDMZZ  
 1991 TRIM GAIN ON GAMMA  
 1992 TRIM GAIN ON THO(AUTO ROTATN)  
 POST)  
 TRIM GAIN ON GMCON

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>68 | DESCRIPTION                                   | AH-56A | XH-51A |
|------------------------------|------------|---|--------|--------|
| 2000 TRMUPD                  |            | TRIM UPDATE FLAG<br>0=OFF,1=ON                | 0.0    | 0.0    |
| 2001 THTRORS(40.4)           |            | BLADE TORSION MODE - 4 BLADES<br>DISPLACEMENT | 0.0    | 0.0    |
| 2002                         |            |   | 0.0    | 0.0    |
| 2003                         |            |   | 0.0    | 0.0    |
| 2004                         |            |   | 0.0    | 0.0    |
| 2005                         |            |   | 0.0    | 0.0    |
| 2006                         |            |   | 0.0    | 0.0    |
| 2007                         |            |   | 0.0    | 0.0    |
| 2008                         |            |   | 0.0    | 0.0    |
| 2009                         |            |   | 0.0    | 0.0    |
| 2010                         |            |   | 0.0    | 0.0    |
| 2011                         |            |   | 0.0    | 0.0    |
| 2012                         |            |   | 0.0    | 0.0    |
| 2013                         |            |   | 0.0    | 0.0    |
| 2014                         |            |   | 0.0    | 0.0    |
| 2015                         |            |   | 0.0    | 0.0    |
| 2016                         |            |   | 0.0    | 0.0    |
| 2017                         |            |   | 0.0    | 0.0    |
| 2018                         |            |   | 0.0    | 0.0    |
| 2019                         |            |   | 0.0    | 0.0    |
| 2020                         |            |   | 0.0    | 0.0    |
| 2021                         |            |   | 0.0    | 0.0    |
| 2022                         |            |   | 0.0    | 0.0    |
| 2023                         |            |   | 0.0    | 0.0    |
| 2024                         |            |   | 0.0    | 0.0    |
| 2025                         |            |   | 0.0    | 0.0    |
| 2026                         |            |   | 0.0    | 0.0    |
| 2027                         |            |   | 0.0    | 0.0    |
| 2028                         |            |   | 0.0    | 0.0    |
| 2029                         |            |   | 0.0    | 0.0    |
| 2030                         |            |   | 0.0    | 0.0    |
| 2031                         |            |   | 0.0    | 0.0    |
| 2032                         |            |   | 0.0    | 0.0    |
| 2033                         |            |   | 0.0    | 0.0    |



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**AH-56A**

[illegible]

**XH-51A**

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**DESCRIPTION**

**AH-56A**

[illegible]

DESCRIPTION

**AH-56A**

[illegible][illegible]



REXOR DATA PAGE 73  
R/A PRG.SYMBOL DESCRIPTION

XH-51A

AH-56A

|      |     |
|------|-----|
| 2180 | 0.0 |
| 2181 | 0.0 |
| 2182 | 0.0 |
| 2183 | 0.0 |
| 2184 | 0.0 |
| 2185 | 0.0 |
| 2186 | 0.0 |
| 2187 | 0.0 |
| 2188 | 0.0 |
| 2189 | 0.0 |
| 2190 | 0.0 |
| 2191 | 0.0 |
| 2192 | 0.0 |
| 2193 | 0.0 |
| 2194 | 0.0 |
| 2195 | 0.0 |
| 2196 | 0.0 |
| 2197 | 0.0 |
| 2198 | 0.0 |
| 2199 | 0.0 |
| 2200 | 0.0 |
| 2201 | 0.0 |
| 2202 | 0.0 |
| 2203 | 0.0 |
| 2204 | 0.0 |
| 2205 | 0.0 |
| 2206 | 0.0 |
| 2207 | 0.0 |
| 2208 | 0.0 |
| 2209 | 0.0 |
| 2210 | 0.0 |
| 2211 | 0.0 |
| 2212 | 0.0 |
| 2213 | 0.0 |
| 2214 | 0.0 |
| 2215 | 0.0 |
| 2216 | 0.0 |

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**PAGE**

WFO2 DATA  
R/A ORG. SYMBOL

**XH-51A**

**AH-56A**

|      |     |
|------|-----|
| 2217 | 0.0 |
| 2218 | 0.0 |
| 2219 | 0.0 |
| 2220 | 0.0 |
| 2221 | 0.0 |
| 2222 | 0.0 |
| 2223 | 0.0 |
| 2224 | 0.0 |
| 2225 | 0.0 |
| 2226 | 0.0 |
| 2227 | 0.0 |
| 2228 | 0.0 |
| 2229 | 0.0 |
| 2230 | 0.0 |
| 2231 | 0.0 |
| 2232 | 0.0 |
| 2233 | 0.0 |
| 2234 | 0.0 |
| 2235 | 0.0 |
| 2236 | 0.0 |
| 2237 | 0.0 |
| 2238 | 0.0 |
| 2239 | 0.0 |
| 2240 | 0.0 |
| 2241 | 0.0 |
| 2242 | 0.0 |
| 2243 | 0.0 |
| 2244 | 0.0 |
| 2245 | 0.0 |
| 2246 | 0.0 |
| 2247 | 0.0 |
| 2248 | 0.0 |
| 2249 | 0.0 |
| 2250 | 0.0 |
| 2251 | 0.0 |
| 2252 | 0.0 |
| 2253 | 0.0 |

REXOR DATA PAGE 75  
 R/A PRG.SYMBOL DESCRIPTION

|      |     |        |
|------|-----|--------|
| 2254 | 0:0 | XH-51A |
| 2255 | 0:0 |        |
| 2256 | 0:0 |        |
| 2257 | 0:0 |        |
| 2258 | 0:0 |        |
| 2259 | 0:0 |        |
| 2260 | 0:0 |        |
| 2261 | 0:0 |        |
| 2262 | 0:0 |        |
| 2263 | 0:0 |        |
| 2264 | 0:0 |        |
| 2265 | 0:0 |        |
| 2266 | 0:0 |        |
| 2267 | 0:0 |        |
| 2268 | 0:0 |        |
| 2269 | 0:0 |        |
| 2270 | 0:0 |        |
| 2271 | 0:0 |        |
| 2272 | 0:0 |        |
| 2273 | 0:0 |        |
| 2274 | 0:0 |        |
| 2275 | 0:0 |        |
| 2276 | 0:0 |        |
| 2277 | 0:0 |        |
| 2278 | 0:0 |        |
| 2279 | 0:0 |        |
| 2280 | 0:0 |        |
| 2281 | 0:0 |        |
| 2282 | 0:0 |        |
| 2283 | 0:0 |        |
| 2284 | 0:0 |        |
| 2285 | 0:0 |        |
| 2286 | 0:0 |        |
| 2287 | 0:0 |        |
| 2288 | 0:0 |        |
| 2289 | 0:0 |        |
| 2290 | 0:0 |        |

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**PAGE**

REXOR DATA  
R/A PRG.SYMBOL

**XH-51A**

**AH-56A**

|      | THG1(40,4) | BLADE TORSION MODE - 4 BLADES<br>ACCELERATION |     |
|------|------------|---|-----|
| 2291 |            |   | 0.0 |
| 2292 |            |   | 0.0 |
| 2293 |            |   | 0.0 |
| 2294 |            |   | 0.0 |
| 2295 |            |   | 0.0 |
| 2296 |            |   | 0.0 |
| 2297 |            |   | 0.0 |
| 2298 |            |   | 0.0 |
| 2299 |            |   | 0.0 |
| 2300 |            |   | 0.0 |
| 2301 |            |   | 0.0 |
| 2302 |            |   | 0.0 |
| 2303 |            |   | 0.0 |
| 2304 |            |   | 0.0 |
| 2305 |            |   | 0.0 |
| 2306 |            |   | 0.0 |
| 2307 |            |   | 0.0 |
| 2308 |            |   | 0.0 |
| 2309 |            |   | 0.0 |
| 2310 |            |   | 0.0 |
| 2311 |            |   | 0.0 |
| 2312 |            |   | 0.0 |
| 2313 |            |   | 0.0 |
| 2314 |            |   | 0.0 |
| 2315 |            |   | 0.0 |
| 2316 |            |   | 0.0 |
| 2317 |            |   | 0.0 |
| 2318 |            |   | 0.0 |
| 2319 |            |   | 0.0 |
| 2320 |            |   | 0.0 |
| 2321 | THG1(40,4) | BLADE TORSION MODE - 4 BLADES<br>ACCELERATION | 0.0 |
| 2322 |            |   | 0.0 |
| 2323 |            |   | 0.0 |
| 2324 |            |   | 0.0 |
| 2325 |            |   | 0.0 |



REXOR DATA PAGE 77  
R/A PRG.SYMBOL DESCRIPTION

XH-51A

AH-56A

|      |     |     |
|------|-----|-----|
| 2326 | 0.0 | 0.0 |
| 2327 | 0.0 | 0.0 |
| 2328 | 0.0 | 0.0 |
| 2329 | 0.0 | 0.0 |
| 2330 | 0.0 | 0.0 |
| 2331 | 0.0 | 0.0 |
| 2332 | 0.0 | 0.0 |
| 2333 | 0.0 | 0.0 |
| 2334 | 0.0 | 0.0 |
| 2335 | 0.0 | 0.0 |
| 2336 | 0.0 | 0.0 |
| 2337 | 0.0 | 0.0 |
| 2338 | 0.0 | 0.0 |
| 2339 | 0.0 | 0.0 |
| 2340 | 0.0 | 0.0 |
| 2341 | 0.0 | 0.0 |
| 2342 | 0.0 | 0.0 |
| 2343 | 0.0 | 0.0 |
| 2344 | 0.0 | 0.0 |
| 2345 | 0.0 | 0.0 |
| 2346 | 0.0 | 0.0 |
| 2347 | 0.0 | 0.0 |
| 2348 | 0.0 | 0.0 |
| 2349 | 0.0 | 0.0 |
| 2350 | 0.0 | 0.0 |
| 2351 | 0.0 | 0.0 |
| 2352 | 0.0 | 0.0 |
| 2353 | 0.0 | 0.0 |
| 2354 | 0.0 | 0.0 |
| 2355 | 0.0 | 0.0 |
| 2356 | 0.0 | 0.0 |
| 2357 | 0.0 | 0.0 |
| 2358 | 0.0 | 0.0 |
| 2359 | 0.0 | 0.0 |
| 2360 | 0.0 | 0.0 |
| 2361 | 0.0 | 0.0 |
| 2362 | 0.0 | 0.0 |

**X4-51A**

**AH-56A**

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REXOR DATA  
F/4 PRG.SYMBOL

[illegible]

REXOR DATA  
R/A PRG.SYMBOL

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**AH-56A**

**XH-51A**

| REXUR DATA<br>R/A PFG.SYMBOL | PAGE<br>81 | DESCRIPTION                   | AM-56A | XH-51A |
|------------------------------|------------|-------------------------------|--------|--------|
| 2474                         |            |                               | 0.0    | 0.0    |
| 2475                         |            |                               | 0.0    | 0.0    |
| 2476                         |            |                               | 0.0    | 0.0    |
| 2477                         |            |                               | 0.0    | 0.0    |
| 2478                         |            |                               | 0.0    | 0.0    |
| 2479                         |            |                               | 0.0    | 0.0    |
| 2480                         |            |                               | 0.0    | 0.0    |
| 2481                         | OPEN(11)   | OPEN                          | 0.0    | 0.0    |
| 2482                         |            |                               | 0.0    | 0.0    |
| 2483                         |            |                               | 0.0    | 0.0    |
| 2484                         |            |                               | 0.0    | 0.0    |
| 2485                         |            |                               | 0.0    | 0.0    |
| 2486                         |            |                               | 0.0    | 0.0    |
| 2487                         |            |                               | 0.0    | 0.0    |
| 2488                         |            |                               | 0.0    | 0.0    |
| 2489                         |            |                               | 0.0    | 0.0    |
| 2490                         |            |                               | 0.0    | 0.0    |
| 2491                         |            |                               | 0.0    | 0.0    |
| 2492                         | LF3        | ROTOR HEIGHT ABOVE GYRO, AMCS | 0.0    | 0.0    |
| 2493                         | OPEN(21)   | OPEN                          | 0.0    | 0.0    |
| 2494                         |            |                               | 0.0    | 0.0    |
| 2495                         |            |                               | 0.0    | 0.0    |
| 2496                         |            |                               | 0.0    | 0.0    |
| 2497                         |            |                               | 0.0    | 0.0    |
| 2498                         |            |                               | 0.0    | 0.0    |
| 2499                         |            |                               | 0.0    | 0.0    |
| 2500                         |            |                               | 0.0    | 0.0    |
| 2501                         |            |                               | 0.0    | 0.0    |
| 2502                         |            |                               | 0.0    | 0.0    |
| 2503                         |            |                               | 0.0    | 0.0    |
| 2504                         |            |                               | 0.0    | 0.0    |
| 2505                         |            |                               | 0.0    | 0.0    |
| 2506                         |            |                               | 0.0    | 0.0    |
| 2507                         |            |                               | 0.0    | 0.0    |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>32 | DESCRIPTION                                      | AM-56A      | XH-51A      |
|------------------------------|------------|--|-------------|-------------|
| 2508                         |            |  | 0.0         | 0.0         |
| 2509                         |            |  | 0.0         | 0.0         |
| 2510                         |            |  | 0.0         | 0.0         |
| 2511                         |            |  | 0.0         | 0.0         |
| 2512                         |            |  | 0.0         | 0.0         |
| 2513                         |            |  | 0.0         | 0.0         |
| 2514 XSTDIF                  |            | FEEDBACK APM LENGTH,SPAN,AMCS                    | 0.0         | 0.0         |
| 2515 FLAP2                   |            | .NF.0,NO 2ND. FLAP MODE                          | 0.0         | 0.0         |
| 2516 PSIFB                   |            | FEEDBACK PHASE ANGLE,AMCS                        | 0.0         | 0.0         |
| 2517 OPEN(2)                 |            | OPEN   | 0.0         | 0.0         |
| 2518                         |            |  | 0.0         | 0.0         |
| 2519 YRM1(3)                 |            | LATERAL DISPL. OF FDBK MOUNT,<br>EACH BLADE MODE | 0.0         | 0.0         |
| 2520                         |            |  | 0.0         | 0.0         |
| 2521                         |            |  | 0.0         | 0.0         |
| 2522 ZRM1(3)                 |            | VERT. DISPL. OF FDBK. MOUNT,<br>EACH BLADE MODE  | 0.0         | 0.0         |
| 2523                         |            |  | 0.0         | 0.0         |
| 2524                         |            |  | 0.0         | 0.0         |
| 2525 YRMPI(3)                |            | LATERAL SLOPE OF FDBK. MOUNT,<br>EACH BLADE MODE | 9.5580E-10  | 3.9610E-10  |
| 2526                         |            |  | 0.0         | 0.0         |
| 2527                         |            |  | 0.0         | 0.0         |
| 2528 ZRMPI(3)                |            | VERT. SLOPE OF FDBK. MOUNT,<br>EACH BLADE MODE   | 0.0         | 0.0         |
| 2529                         |            |  | -3.3260E-06 | -3.7660E-08 |
| 2530                         |            |  | -5.8120E-07 | 3.2900E-11  |

| REXOR DATA<br>R/A PAG.SYMBOL | PAGE<br>33 | DESCRIPTION                                    | AH-56A     | XH-51A |
|------------------------------|------------|--|------------|--------|
| 2531 YR4ST                   |            | LATERAL SLOPE OF FDBK. MOUNT,<br>GEOMETRY,AMCS | 0.0        | 0.0    |
| 2532 ZR4ST                   |            | VERT. SLOPE OF FDBK. MOUNT,<br>GEOMETRY,AMCS   | 0.0        | 0.0    |
| 2533 OPEN(12)                |            | OPEN   | 0.0        | 0.0    |
| 2534                         |            |  | 0.0        | 0.0    |
| 2535                         |            |  | 0.0        | 0.0    |
| 2536                         |            |  | 0.0        | 0.0    |
| 2537                         |            |  | 0.0        | 0.0    |
| 2538                         |            |  | 0.0        | 0.0    |
| 2539                         |            |  | 0.0        | 0.0    |
| 2540                         |            |  | 0.0        | 0.0    |
| 2541                         |            |  | 0.0        | 0.0    |
| 2542                         |            |  | 0.0        | 0.0    |
| 2543                         |            |  | 0.0        | 0.0    |
| 2544                         |            |  | 0.0        | 0.0    |
| 2545 KF3G                    |            | FEEDBACK SPRING,AMCS                           | 0.0        | 0.0    |
| 2546 ZJLIM                   |            | FEEDBACK ARM SLOPE LIMIT,AMCS                  | 0.0        | 0.0    |
| 2547 RFB                     |            | GYRO FEEDBACK ARM RADIUS,AMCS                  | 0.0        | 0.0    |
| 2548 ZOG                     |            | GYRO DEPTH BELOW FUSELAGE REF.<br>AMCS         | 0.0        | 0.0    |
| 2549 DPHIS                   |            | SHAFT ROLL TILT DAMPING                        | 0.0        | 0.0    |
| 2550 DTHTS                   |            | SHAFT PITCH TILT DAMPING                       | 0.0        | 0.0    |
| 2551 PSLOPL                  |            | SLOPE LIMIT ON PHI. (SNP.)                     | 8.2500E-02 | 0.0    |
| 2552 TSLOPL                  |            | SLOPE LIMIT ON THETA (SNP.)                    | 8.2500E-02 | 0.0    |

| REXOR DATA<br>R/A PRG.SYMBOL | PAGE<br>84 | DESCRIPTION                            | AN-56A     | XH-51A     |
|------------------------------|------------|--|------------|------------|
| 2553 TCUTO                   |            | NO. ADDITIONAL CYCLES, 4 BLADE<br>TRIM | 8.0000E 00 | 8.0000E 00 |
| 2554 TCUT3                   |            | NO. ADDITIONAL CYCLES, INT.<br>TRIM    | 0.0        | 0.0        |
| 2555 ISTALL                  |            | 0.=CALL AERQ, 1.=CALL STALL            | 0.0        | 0.0        |
| 2556 INOLD                   |            | =0. NORMAL=1.                          | 0.0        | 0.0        |
| 2557 QCMCON                  |            | NOT USED                               | 0.0        | 0.0        |
| 2558 QSMCON                  |            | NOT USED                               | 0.0        | 0.0        |
| 2559 FACTM                   |            | FACTOR IN STALL RCUTINE                | 5.0000E-01 | 5.0000E-01 |
| 2560 IHA                     |            | NO. HARMONICS+1 IN SINGLE BLDE<br>TRIM | 2.0000E 00 | 0.0        |
| 2561 QMCON(6)                |            |  | 7.0000E-01 | 0.0        |
| 2562                         |            |  | 7.0000E-01 | 0.0        |
| 2563                         |            |  | 5.5000E-01 | 0.0        |
| 2564                         |            |  | 4.0000E-01 | 0.0        |
| 2565                         |            |  | 0.0        | 0.0        |
| 2566                         |            |  | 0.0        | 0.0        |
| 2567 OPEN(3)                 |            | OPFN                                   | 0.0        | 0.0        |
| 2568                         |            |  | 0.0        | 0.0        |
| 2569                         |            |  | 0.0        | 0.0        |
| 2570 STA70                   |            | STATION WHERE SWEEP AND DROOP<br>BEGIN | 5.8330E 00 | 2.3300E 00 |
| 2571 GAIN1(19)               |            | SINGLE BLADE TRIM GAIN-BP              | 5.0000E-01 | 5.0000E-01 |
| 2572                         |            | SINGLE BLADE TRIM GAIN-PHI             | 5.0000E-01 | 5.0000E-01 |
| 2573                         |            | SINGLE BLADE TRIM GAIN-THO<br>OR ALPHA | 5.0000E-01 | 5.0000E-01 |



| REXOR DATA<br>R/A PPG-SYMBOL | PAGE<br>85 | DESCRIPTION                               | AM-56A      | XH-51A      |
|------------------------------|------------|---|-------------|-------------|
| 2574                         |            | SINGLE BLADE TRIM GAIN-A1S                | 5.0000E-01  | 5.0000E-01  |
| 2575                         |            | SINGLE BLADE TRIM GAIN-B1S                | 5.0000E-01  | 5.0000E-01  |
| 2576                         |            | SINGLE BLADE TRIM GAIN-TH0TR              | 5.0000E-01  | 5.0000E-01  |
| 2577                         |            | SINGLF BLADE TRIM GAIN-GLCON<br>AND GMCON | 5.0000E-01  | 5.0000E-01  |
| 2578                         |            |   | 5.0000E-01  | 5.0000E-01  |
| 2579                         |            |   | 5.0000E-01  | 5.0000E-01  |
| 2580                         |            |   | 5.0000E-01  | 5.0000E-01  |
| 2581                         |            |   | 5.0000E-01  | 5.0000E-01  |
| 2582                         |            |   | 5.0000E-01  | 5.0000E-01  |
| 2583                         |            |   | 5.0000E-01  | 5.0000E-01  |
| 2584                         |            |   | 0.0         | 0.0         |
| 2585                         |            |   | 0.0         | 0.0         |
| 2586                         |            |   | 0.0         | 0.0         |
| 2587                         |            |   | 0.0         | 0.0         |
| 2588                         |            |   | 0.0         | 0.0         |
| 2589                         |            |   | 0.0         | 0.0         |
| 2590                         | OPEN(11)   | OPEN                                      | 0.0         | 0.0         |
| 2591                         |            |   | 0.0         | 0.0         |
| 2592                         |            |   | 0.0         | 0.0         |
| 2593                         |            |   | 0.0         | 0.0         |
| 2594                         |            |   | 0.0         | 0.0         |
| 2595                         |            |   | 0.0         | 0.0         |
| 2596                         |            |   | 0.0         | 0.0         |
| 2597                         |            |   | 0.0         | 0.0         |
| 2598                         |            |   | 0.0         | 0.0         |
| 2599                         |            |   | 0.0         | 0.0         |
| 2600                         |            |   | 0.0         | 0.0         |
| 2601                         | ALFA(20)   | AIR FRAME AERO.DATA - TABLES<br>ARGUMENT  | -1.8000E 02 | -1.8000E 02 |
| 2602                         |            |   | -9.0000E 01 | -1.4100E 02 |
| 2603                         |            |   | -2.3000E 01 | -9.6000E 01 |
| 2604                         |            |   | -6.0000E 00 | -5.1000E 01 |
| 2605                         |            |   | -4.0000E 00 | -1.9500E 01 |
| 2606                         |            |   | -2.0000E 00 | -1.8000E 01 |

REXOR DATA PAGE 86  
R/A PRG.SYMBOL DESCRIPTION

|             | AH-56A      | XH-51A      |
|-------------|-------------|-------------|
| 2607        | 0.0         | -1.4000E 01 |
| 2608        | 2.0000E 00  | -1.0000E 01 |
| 2609        | 4.0000E 00  | -6.0000E 00 |
| 2610        | 6.0000E 00  | -2.0000E 00 |
| 2611        | 7.0000E 00  | 2.0000E 00  |
| 2612        | 8.0000E 00  | 6.0000E 00  |
| 2613        | 9.0000E 00  | 8.0000E 00  |
| 2614        | 1.0000E 01  | 8.5000E 00  |
| 2615        | 1.2000E 01  | 1.0500E 01  |
| 2616        | 1.4000E 01  | 3.9000E 01  |
| 2617        | 1.6000E 01  | 8.4000E 01  |
| 2618        | 1.8000E 01  | 1.2900E 02  |
| 2619        | 9.0000E 01  | 1.7900E 02  |
| 2620        | 1.6000E 02  | 1.8000E 02  |
| 2621 C(120) | 0.0         | 0.0         |
| 2622        | 0.0         | 1.6500E 00  |
| 2623        | -1.2307E 00 | 0.0         |
| 2624        | 9.6361E-02  | -1.6500E 00 |
| 2625        | 2.5350E-01  | -1.0150E 00 |
| 2626        | 4.1600E-01  | -9.3500E-01 |
| 2627        | 5.7350E-01  | -6.3500E-01 |
| 2628        | 7.3000E-01  | -3.3500E-01 |
| 2629        | 8.8750E-01  | -3.5000E-02 |
| 2630        | 1.0425E 00  | 2.6500E-01  |
| 2631        | 1.1178E 00  | 5.6500E-01  |
| 2632        | 1.1965E 00  | 8.6500E-01  |
| 2633        | 1.2485E 00  | 1.0000E 00  |
| 2634        | 1.2168E 00  | 1.0150E 00  |
| 2635        | 1.0650E 00  | 9.5000E-01  |
| 2636        | 9.4500E-01  | 1.6500E 00  |
| 2637        | 9.0000E-01  | 0.0         |
| 2638        | 9.0000E-01  | -1.6500E 00 |
| 2639        | 1.2540E-02  | 0.0         |
| 2640        | 0.0         | 0.0         |

LIFT COEFF.

REXOR DATA PAGE 87  
R/A PPG.SYMBOL DESCRIPTION

2641 CM(20)

PITCHING MOMENT COEFF.

AH-56A XM-51A

|             |             |
|-------------|-------------|
| -4.1400E-02 | 0.0         |
| 4.5860E-01  | 0.0         |
| -1.5165E-02 | 0.0         |
| -6.4656E-03 | 0.0         |
| 2.1072E-02  | 0.0         |
| 2.4026E-02  | 0.0         |
| 3.6134E-03  | 0.0         |
| -3.0658E-03 | -6.5000E-02 |
| -8.2950E-03 | -4.0000E-02 |
| -1.3295E-02 | 0.0         |
| -1.7321E-02 | 4.0000E-02  |
| -2.2498E-02 | 8.0000E-02  |
| -4.6102E-02 | 7.0000E-02  |
| -7.8441E-02 | 6.0000E-02  |
| -1.1828E-01 | -3.0000E-02 |
| -1.3952E-01 | 0.0         |
| -1.6640E-01 | 0.0         |
| -2.0140E-01 | 0.0         |
| -5.4255E-01 | 0.0         |
| -4.1400E-02 | 0.0         |

AIR FRAME AEPC.DATA - TABLES  
DRAG COEFFICIENT

2661 CD(20)

|            |            |
|------------|------------|
| 2.0000E-01 | 1.0000E-01 |
| 2.0000E 00 | 1.0500E 00 |
| 1.3953E-01 | 1.5000E 00 |
| 1.1410E-01 | 1.0500E 00 |
| 1.1151E-01 | 2.4800E-01 |
| 1.1308E-01 | 1.4000E-01 |
| 1.2724E-01 | 8.2000E-02 |
| 1.4247E-01 | 5.0000E-02 |
| 1.7356E-01 | 3.8000E-02 |
| 2.0131E-01 | 4.5000E-02 |
| 2.2128E-01 | 7.1000E-02 |
| 2.4975E-01 | 1.1900E-01 |
| 2.9181E-01 | 1.6800E-01 |
| 3.2494E-01 | 1.8500E-01 |

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REXOR DATA PAGE 88  
R/A PRG-SYMBOL DESCRIPTION

|               | AM-56A     | XH-51A     |
|---------------|------------|------------|
| 2675          | 3.7143E-01 | 2.4800E-01 |
| 2676          | 4.2477E-01 | 1.0500E 00 |
| 2677          | 4.8000E-01 | 1.5000E 00 |
| 2678          | 5.3500E-01 | 1.0500E 00 |
| 2679          | 2.0000E 00 | 1.0000E-01 |
| 2680          | 2.0000E-01 | 1.0000E-01 |
| 2681 AWING    | 1.9500E 02 | 7.0000E 01 |
| 2682 CWING    | 7.4500E 00 | 4.3100E 00 |
| 2683 ADTR     | 2.3300E 01 | 4.2500E 00 |
| 2684 FTR      | 5.0000E 00 | 3.0000E 00 |
| 2685 A        | 5.7300E 00 | 5.7300E 00 |
| 2686 R        | 9.7000E-01 | 9.7000E-01 |
| 2687 OPEN     | 0.0        | 0.0        |
| 2688 CUTOOT   | 6.0000E 00 | 2.3300E 00 |
| 2689 ILDOK    | 0.0        | 1.0000E 00 |
| 2690 IF7IL    | 0.0        | 1.0000E 00 |
| 2691 XNTAB(5) | 0.0        | 0.0        |
| 2692          | 0.0        | 1.0000E 00 |
| 2693          | 0.0        | 0.0        |
| 2694          | 0.0        | 0.0        |
| 2695          | 0.0        | 0.0        |
| 2696 TCTAB(5) | 0.0        | 1.2000E-01 |
| 2697          | 0.0        | 1.2000E-01 |
| 2698          | 0.0        | 0.0        |
| 2699          | 0.0        | 0.0        |

REXNR DATA PAGE 89  
 P/A PRG.SYMBOL DESCRIPTION

|      |          |      |        |        |
|------|----------|------|--------|--------|
| 2700 |          |      | AM-56A | XM-51A |
| 2701 | CLTAB(5) |      | 0.0    | 0.0    |
| 2702 |          |      | 0.0    | 0.0    |
| 2703 |          |      | 0.0    | 0.0    |
| 2704 |          |      | 0.0    | 0.0    |
| 2705 |          |      | 0.0    | 0.0    |
| 2706 | CPEN(95) | CPEN | 0.0    | 0.0    |
| 2707 |          |      | 0.0    | 0.0    |
| 2708 |          |      | 0.0    | 0.0    |
| 2709 |          |      | 0.0    | 0.0    |
| 2710 |          |      | 0.0    | 0.0    |
| 2711 |          |      | 0.0    | 0.0    |
| 2712 |          |      | 0.0    | 0.0    |
| 2713 |          |      | 0.0    | 0.0    |
| 2714 |          |      | 0.0    | 0.0    |
| 2715 |          |      | 0.0    | 0.0    |
| 2716 |          |      | 0.0    | 0.0    |
| 2717 |          |      | 0.0    | 0.0    |
| 2718 |          |      | 0.0    | 0.0    |
| 2719 |          |      | 0.0    | 0.0    |
| 2720 |          |      | 0.0    | 0.0    |
| 2721 |          |      | 0.0    | 0.0    |
| 2722 |          |      | 0.0    | 0.0    |
| 2723 |          |      | 0.0    | 0.0    |
| 2724 |          |      | 0.0    | 0.0    |
| 2725 |          |      | 0.0    | 0.0    |
| 2726 |          |      | 0.0    | 0.0    |
| 2727 |          |      | 0.0    | 0.0    |
| 2728 |          |      | 0.0    | 0.0    |
| 2729 |          |      | 0.0    | 0.0    |
| 2730 |          |      | 0.0    | 0.0    |
| 2731 |          |      | 0.0    | 0.0    |
| 2732 |          |      | 0.0    | 0.0    |
| 2733 |          |      | 0.0    | 0.0    |
| 2734 |          |      | 0.0    | 0.0    |

**AH-56A**

[illegible]

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REXOR DATA PAGE 91  
R/A PRG.SYMBOL DESCRIPTION

XH-51A

AH-56A

|             |     |     |
|-------------|-----|-----|
| 2772        | 0.0 | 0.0 |
| 2773        | 0.0 | 0.0 |
| 2774        | 0.0 | 0.0 |
| 2775        | 0.0 | 0.0 |
| 2776        | 0.0 | 0.0 |
| 2777        | 0.0 | 0.0 |
| 2778        | 0.0 | 0.0 |
| 2779        | 0.0 | 0.0 |
| 2780        | 0.0 | 0.0 |
| 2781        | 0.0 | 0.0 |
| 2782        | 0.0 | 0.0 |
| 2783        | 0.0 | 0.0 |
| 2784        | 0.0 | 0.0 |
| 2785        | 0.0 | 0.0 |
| 2786        | 0.0 | 0.0 |
| 2787        | 0.0 | 0.0 |
| 2788        | 0.0 | 0.0 |
| 2789        | 0.0 | 0.0 |
| 2790        | 0.0 | 0.0 |
| 2791        | 0.0 | 0.0 |
| 2792        | 0.0 | 0.0 |
| 2793        | 0.0 | 0.0 |
| 2794        | 0.0 | 0.0 |
| 2795        | 0.0 | 0.0 |
| 2796        | 0.0 | 0.0 |
| 2797        | 0.0 | 0.0 |
| 2798        | 0.0 | 0.0 |
| 2799        | 0.0 | 0.0 |
| 2800        | 0.0 | 0.0 |
| 2801 DP-(4) | 0.0 | 0.0 |
| 2802        | 0.0 | 0.0 |
| 2803        | 0.0 | 0.0 |
| 2804        | 0.0 | 0.0 |

PSEUDO PITCH HORN SAVE DATA  
DISPLACEMENT

| REXOR DATA<br>R/A PFG.SYMBOL | PAGE<br>92 | DESCRIPTION                                       | AH-56A     | XH-51A     |
|------------------------------|------------|---|------------|------------|
| 2805 DPFD(4)                 |            | PSEUDO PITCH HORN SAVE DATA<br>VELOCITY           | 0.0        | 0.0        |
| 2806                         |            |   | 0.0        | 0.0        |
| 2807                         |            |   | 0.0        | 0.0        |
| 2808                         |            |   | 0.0        | 0.0        |
| 2809 DPF1(4)                 |            | PSEUDO PITCH HORN SAVE DATA<br>DISPLACEMENT STA.1 | 0.0        | 0.0        |
| 2810                         |            |   | 0.0        | 0.0        |
| 2811                         |            |   | 0.0        | 0.0        |
| 2812                         |            |   | 0.0        | 0.0        |
| 2813 DP=2(4)                 |            | PSEUDO PITCH HORN SAVE DATA<br>DISPLACEMENT STA.2 | 0.0        | 0.0        |
| 2814                         |            |   | 0.0        | 0.0        |
| 2815                         |            |   | 0.0        | 0.0        |
| 2816                         |            |   | 0.0        | 0.0        |
| 2817 OPEN(13)                |            | (PEN  | 0.0        | 0.0        |
| 2818                         |            |   | 0.0        | 0.0        |
| 2819                         |            |   | 0.0        | 0.0        |
| 2820                         |            |   | 0.0        | 0.0        |
| 2821                         |            |   | 0.0        | 0.0        |
| 2822                         |            |   | 0.0        | 0.0        |
| 2823                         |            |   | 0.0        | 0.0        |
| 2824                         |            |   | 0.0        | 0.0        |
| 2825                         |            |   | 0.0        | 0.0        |
| 2826                         |            |   | 0.0        | 0.0        |
| 2827                         |            |   | 0.0        | 0.0        |
| 2828                         |            |   | 0.0        | 0.0        |
| 2829                         |            |   | 0.0        | 0.0        |
| 2830 AKJN                    |            | NOT USED  | 5.0000E-01 | 0.0        |
| 2831 TPART(6,6)              |            | 6*6 NUMERICAL DERIVATIVES FOR<br>PARTIAL TRIM     | 1.2500E 04 | 1.2500E 04 |
| 2832                         |            |   | 0.0        | 0.0        |



REXOR DATA PAGE 93  
R/A PRG.SYMBOL DESCRIPTION

|            | AM-56A      | XH-51A      |
|------------|-------------|-------------|
| 2833       | 0.0         | 0.0         |
| 2834       | 2.2000E 04  | 0.0         |
| 2835       | 5.6200E 04  | 8.5000E 04  |
| 2836       | 0.0         | 7.0000E 04  |
| 2837       | 0.0         | 0.0         |
| 2838       | 2.2500E 04  | 2.2500E 04  |
| 2839       | 0.0         | 0.0         |
| 2840       | 1.1000E 05  | 1.1000E 05  |
| 2841       | 0.0         | 0.0         |
| 2842       | 0.0         | 0.0         |
| 2843       | 0.0         | 0.0         |
| 2844       | -1.8800E 05 | -1.8800E 05 |
| 2845       | -9.3000E 04 | -9.3000E 04 |
| 2846       | 4.3000E 04  | 4.3000E 04  |
| 2847       | -1.5600E 05 | -1.5600E 05 |
| 2848       | 0.0         | 0.0         |
| 2849       | 0.0         | 0.0         |
| 2850       | -3.1000E 04 | -3.1000E 04 |
| 2851       | 1.1340E 06  | 1.1340E 06  |
| 2852       | 6.8000E 05  | 6.8000E 05  |
| 2853       | 0.0         | 0.0         |
| 2854       | 0.0         | 0.0         |
| 2855       | 0.0         | 0.0         |
| 2856       | 1.1000E 05  | 1.1000E 05  |
| 2857       | 4.3100E 05  | 4.3100E 05  |
| 2858       | -6.5200E 05 | -6.5200E 05 |
| 2859       | 0.0         | 0.0         |
| 2860       | 0.0         | 0.0         |
| 2861       | 1.0000E 00  | 1.0000E 00  |
| 2862       | 0.0         | 0.0         |
| 2863       | -5.4500E 00 | 0.0         |
| 2864       | 0.0         | 0.0         |
| 2865       | -2.9900E 01 | -2.9900E 01 |
| 2866       |             |             |
| 2867 ***** | 1.0000E 00  | 0.0         |

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| REXOR DATA<br>R/A PRG-SYMBOL | PAGE<br>94 | DESCRIPTION                  | AH-56A     | XH-51A     |
|------------------------------|------------|------------------------------|------------|------------|
| 2868 *****(2)                |            | BILLS - TEMPORARY            | 0.0        | 0.0        |
| 2869                         |            |                              | 0.0        | 0.0        |
| 2870 IDYN                    |            | DYNAMIC TORS. FLAG...NF.0=ON | 0.0        | 0.0        |
| 2871 PPT03(20)               |            | DYNAMIC TORSION TABLE        | 0.0        | 0.0        |
| 2872                         |            |                              | 0.0        | 0.0        |
| 2873                         |            |                              | 3.7300E-03 | 3.7300E-03 |
| 2874                         |            |                              | 5.2200E-02 | 5.2200E-02 |
| 2875                         |            |                              | 1.2700E-01 | 1.2700E-01 |
| 2876                         |            |                              | 2.3900E-01 | 0.0        |
| 2877                         |            |                              | 3.7300E-01 | 0.0        |
| 2878                         |            |                              | 5.0000E-01 | 0.0        |
| 2879                         |            |                              | 6.3900E-01 | 0.0        |
| 2880                         |            |                              | 7.6100E-01 | 0.0        |
| 2881                         |            |                              | 8.8700E-01 | 0.0        |
| 2882                         |            |                              | 9.6600E-01 | 0.0        |
| 2883                         |            |                              | 1.0000E 00 | 0.0        |
| 2884                         |            |                              | 0.0        | 0.0        |
| 2885                         |            |                              | 0.0        | 0.0        |
| 2886                         |            |                              | 0.0        | 0.0        |
| 2887                         |            |                              | 0.0        | 0.0        |
| 2888                         |            |                              | 0.0        | 0.0        |
| 2889                         |            |                              | 0.0        | 0.0        |
| 2890                         |            |                              | 0.0        | 0.0        |
| 2891 OPEN(110)               |            | OPEN                         | 0.0        | 0.0        |
| 2892                         |            |                              | 0.0        | 0.0        |
| 2893                         |            |                              | 0.0        | 0.0        |
| 2894                         |            |                              | 0.0        | 0.0        |
| 2895                         |            |                              | 0.0        | 0.0        |
| 2896                         |            |                              | 0.0        | 0.0        |
| 2897                         |            |                              | 0.0        | 0.0        |
| 2898                         |            |                              | 0.0        | 0.0        |
| 2899                         |            |                              | 0.0        | 0.0        |
| 2900                         |            |                              | 0.0        | 0.0        |
| 2901                         |            |                              | 0.0        | 0.0        |

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## APPENDIX IV

### COMPARISON OF THE C-81 PROGRAM WITH REXOR

As an added task under contract DAAJ02-72-C-0100, it was agreed to provide a preliminary comparison of the U.S. Army's C-81 Program and the REXOR program. The C-81 program was provided through the Eustis Directorate, USAAMRDL, making it possible to study the program, to determine its limitations with respect to analysis of gyro-controlled rigid rotors with flapping feedback, and to incorporate modifications necessary to provide capability to analyze these rotor systems. C-81 and REXOR are similar programs in that level flight or maneuver conditions are calculated on a real-time basis using finite time intervals.

The comparison between C-81 and REXOR was carried out for a 16,000-pound-class attack helicopter configuration with a Lockheed Advanced Mechanical Control System (AMCS). The C-81 program, as provided, is not adequate for analysis of a gyro-controlled rigid rotor with flapping feedback. This made it necessary to modify the C-81 so that the Lockheed rigid rotor and associated AMCS control system could be modeled. Modifications were made to the program so that, by option, it could be implemented either in its conventional mode (i.e., with a hard swashplate), or for a gyro-controlled rigid rotor with flapping feedback. The modifications were made by removing subroutines of C-81 that were incorporated for modelling the control system between the pilot's stick and the rotor system itself. This was accomplished by replacing the existing subroutine (SCASIT) with a completely new subroutine of the same name that models the AMCS control system. Also, subroutines SWAS and VARI were modified to allow for AMCS operation during maneuvers. A variable, IAMCS, was provided in common for the above three subroutines, and this was set to zero in block data as part of the job setup. IAMCS is set to 1 after trim to activate the modifications in SWAS and VARI. All other AMCS input data were built into the revised subroutine SCASIT. No additions were made to the original C-81 input format.

With these modifications, it is possible to operate the program either with or without the AMCS control system incorporated. The program is operated in the direct C-81 mode (conventional swashplate) by replacing the new SCASIT with the original SCASIT. The variable IAMCS remains at zero and does not change to 1 for maneuvers as it does when AMCS is operating. These changes result in some limitations in operating the program: multiple cases are not possible, and the small perturbation analysis (STAB) cannot be performed.

In operating the program, stick aft or right is positive for the AMCS modified program once the maneuver begins. In trim, the original C-81 "hard swashplate" stick is still used. The positive direction for the

longitudinal stick in trim is opposite to that for the AMCS longitudinal stick in a maneuver. To output the correct AMCS trim stick position, the program must be operated at least one time point into a maneuver.

#### INITIAL RESULTS WITH THE C-81 PROGRAM

In initially implementing the C-81 program and comparing it with REXOR and other analyses, certain problems were encountered. These resulted in differences between C-81 and REXOR which were later largely eliminated by findings of the comparison. For completeness of this report, the results of the initial comparison will be discussed. Discrepancies between REXOR and C-81 noted in this initial phase were later greatly improved by two principle modifications.

The AMCS modified C-81 program initially provided results that agreed reasonably well with those from REXOR for maneuvers below 1.5 g. This is shown by Figure 70, where pitch rate and vertical load factors are seen to agree closely between the two programs for a given longitudinal stick input. Roll rate cross-coupling effects are small for both programs. Part of the difference between the roll rate response as shown is due to the REXOR case entering the maneuver condition slightly out of trim. Figure 70 shows that C-81 indicated higher rotor power than REXOR. This rotor power was higher than that predicted by other performance methods as well. It will be shown later that this difference is primarily due to implementation of blade section data in the C-81 for the lift and drag coefficients.

As a maneuver calculation was carried out following trim, the C-81 program was noted to suffer some deterioration when time variant solutions for hingless blade modes were added. For a typical example, if rigid blades were modelled, the quasi-static trim results gave total body loads that were quite small, all less than 10 pounds or 10 foot-pounds. But with blade modes introduced, the error became 2345 foot-pounds in roll moment and 2703 foot-pounds in pitch moment after five rotor revolutions due to changes caused by the blade modes. This meant that following trim, when the blade modes were activated, the aircraft would enter a maneuver with roll and pitch accelerations that were significant.

Initially, difficulty was also experienced with C-81, but not with REXOR, in obtaining high load factors for a pull-up maneuver as shown in Figure 71. For similar stick inputs, REXOR showed that the aircraft achieved a sustained 2 g load factor for 3 seconds, whereas C-81 results showed 1.75 g for the same period of time. Drop-off in airspeed was similar for the two programs but there were differences in both roll and yaw attitudes. More significantly, with respect to rotor power, initial C-81 results indicated an increase in rotor power following entry into the maneuver, whereas REXOR showed power dropping off. In a pull-up maneuver, the rotor will tend to windmill to some extent and the REXOR results, in Figure 71



showing an initial power reduction, are believed to be more consistent with what would occur in an actual flight case.

Another significant limitation determined from the initial comparison is that the C-81 program is satisfactory for study of steady-state level flight and maneuver conditions, but cannot be used for evaluating rigid-rotor stability. The program lacks provisions for modelling blade sweep, blade droop, and cyclic and collective control system stiffness - - all of which are significant parameters in determining rigid-rotor stability.

#### REXOR VS. C-81 AND MODIFICATIONS INCORPORATED

Detailed comparison of REXOR and C-81 revealed differences in three major areas: (1) Induced flow calculations; (2) Tip loss; and (3) Dynamic stall calculations.

In the area of induced flow calculations, C-81 introduces tip loss into its uniform inflow calculation, whereas REXOR does not. In addition, C-81 ignores the inner 8 feet of the blade radius when applying inflow, whereas REXOR does not. Although both programs assume a triangular distribution of downwash, the downwash factors in each program are different. Tip loss in REXOR is accounted for by setting the aerodynamic lift and moment equal to zero at the tip station, as well as adjusting the integration interval at the blade tip. With respect to drag, REXOR calculates in a conventional manner the profile drag at the blade tip. Study of C-81 indicated that no tip loss is accounted for in the lift coefficients at the blade tip.

Dynamic stall is included in both programs in a similar manner based upon the formulation of Reference 8, but significant differences were noted between the two programs. Both programs account for spanwise flow in their calculations but treat spanwise flow differently in their dynamic angle-of-attack calculations. As might be expected, neither program includes spanwise flow in determining the dynamic angle of attack with respect to profile drag. REXOR, also, does not include it in determining the dynamic angle-of-attack due to lift, but C-81 does. In addition, C-81 puts a 20% limit on the angle-of-attack overshoot in obtaining the dynamic maximum lift coefficient, whereas REXOR has no limit. This point alone could be significant in the load factors that can be achieved with each program. Further, for dynamic stall, REXOR places a limit on the lift curve slope where C-81 has no restriction. The correctness of the treatment of dynamic stall in either program is difficult to assess since the consensus of researchers in this area is that current methods are empirical at best, and much research still remains to be done in this area.

The initial results with the C-81 program when implemented for both level flight and high load factor maneuvers gave higher rotor power required compared to the REXOR program. Study of these differences indicated that the problem was due primarily to differences in implementation of the data for  $C_l$  and  $C_d$ , the coefficients of lift and drag, in the two programs. A comparison of blade section data was made



as shown in Figures 72 and 73 where  $C_l$  and  $C_d$  vs. angle of attack is presented for NACA 0012 airfoils at Mach numbers of 0.3 and 0.7. Note that three curves are shown. One curve represents NACA 0012 airfoil data provided with the C-81 program. The second curve represents NASA's NACA 0012 airfoil data published in Reference 11. The third curve shows airfoil characteristics for the C-81 0012 data as corrected for the camber used on the example helicopter rotor blades. It is evident in Figure 72 that the C-81 0012 data shows considerably higher values for maximum lift coefficient than the NASA-furnished 0012 data at both Mach numbers. The variations between the two sets of data appear to be due to the fact that a different airfoil section data base has been used in development and correlation of the C-81 program. To account for these differences and place the two programs on a comparative basis, C-81 was implemented using the NACA 0012 data provided with the program rather than the NASA supplied 0012 data. Results (circular symbols on Figure 74) showed that closer agreement was achieved between C-81 and REXOR. Agreement between the programs was further improved by modifying the C-81 NACA 0012 airfoil data to account for the effect of camber. These results are indicated in Figure 74 by the triangular symbols. The method of introducing the example helicopter blade camber into the C-81 0012 airfoil data was very simple. The C-81 NACA 0012 data was modified for camber using the same increments to the data that were used in modifying the NASA-furnished 0012 data for camber.

The primary lack of agreement between the two analyses is in maximum load factor achieved for a given stick input and in power required for level flight and maneuvers. The modifications made to the blade section airfoil data improve correlation in both these areas. The power requirements are in much closer agreement, and the load factor achieved in C-81 is up from 1.75 to 1.80 g. In order to determine the impact of control input variation on maximum load factor, a gradual pull-up maneuver was made with C-81. The results presented in Figure 75 show that by proper adjustment of input time history, load factors in excess of 2 g can be obtained for the example helicopter configuration using C-81. However, the power required in this maneuver is still higher than that obtained from REXOR.

Additional improvement in correlation between C-81 and REXOR was achieved by introduction of improved fuselage and stabilizer aerodynamic data consistent with both programs. A different format is required for the data in each program, and close examination of the input data revealed that corrections should be made to the C-81 data in this area. Figure 76 shows the effect of this corrected data on forward flight performance. Note that these corrections bring the C-81 performance calculations for the example helicopter into closer agreement with performance results from Lockheed's performance program and the charts of Reference 12. Figure 77 shows the effect of this corrected fuselage and stabilizer data on the high load factor pull-up maneuver at 150 knots previously described.

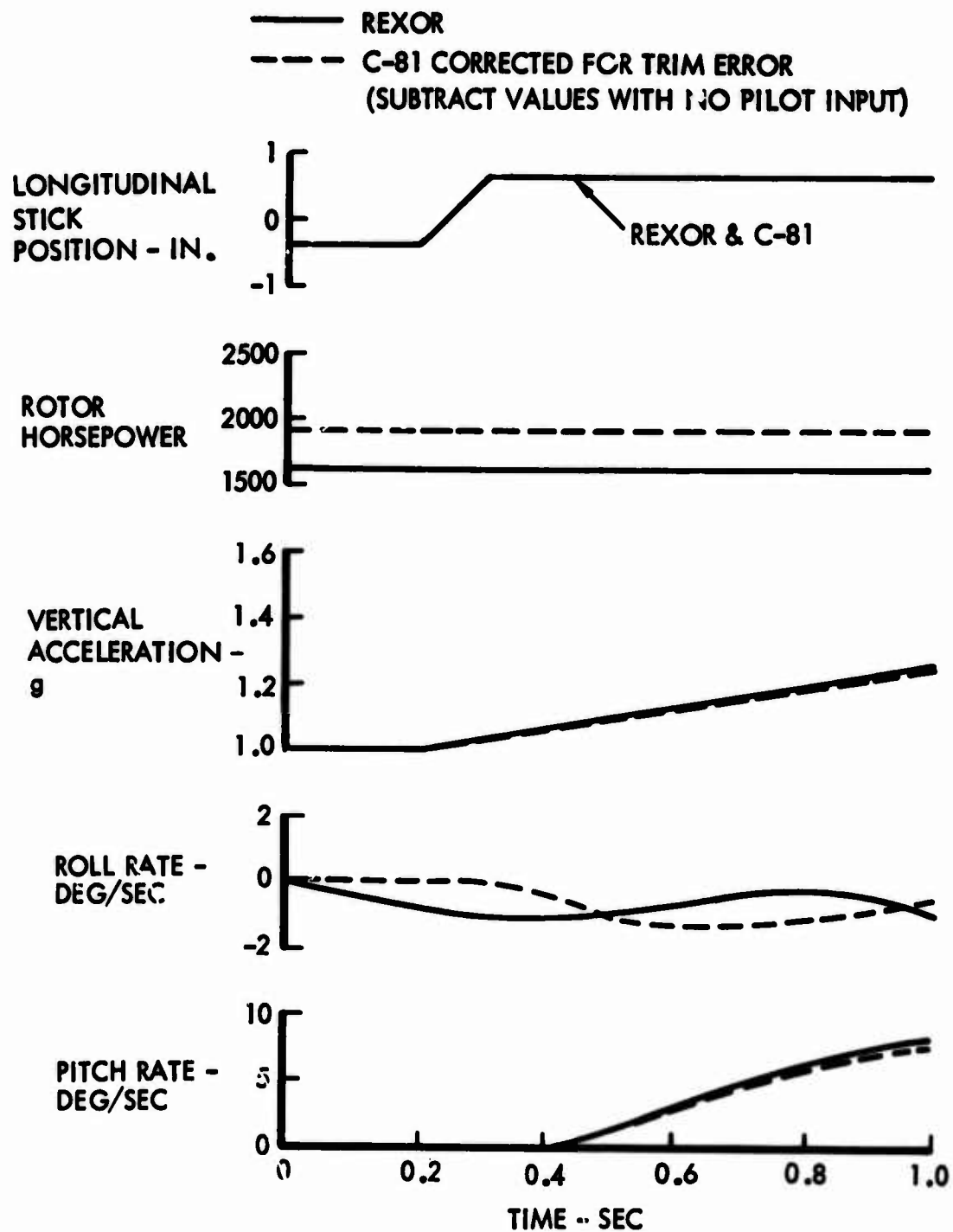


Figure 70. Longitudinal Response 1-Inch Longitudinal Control Input, 150 Knots.

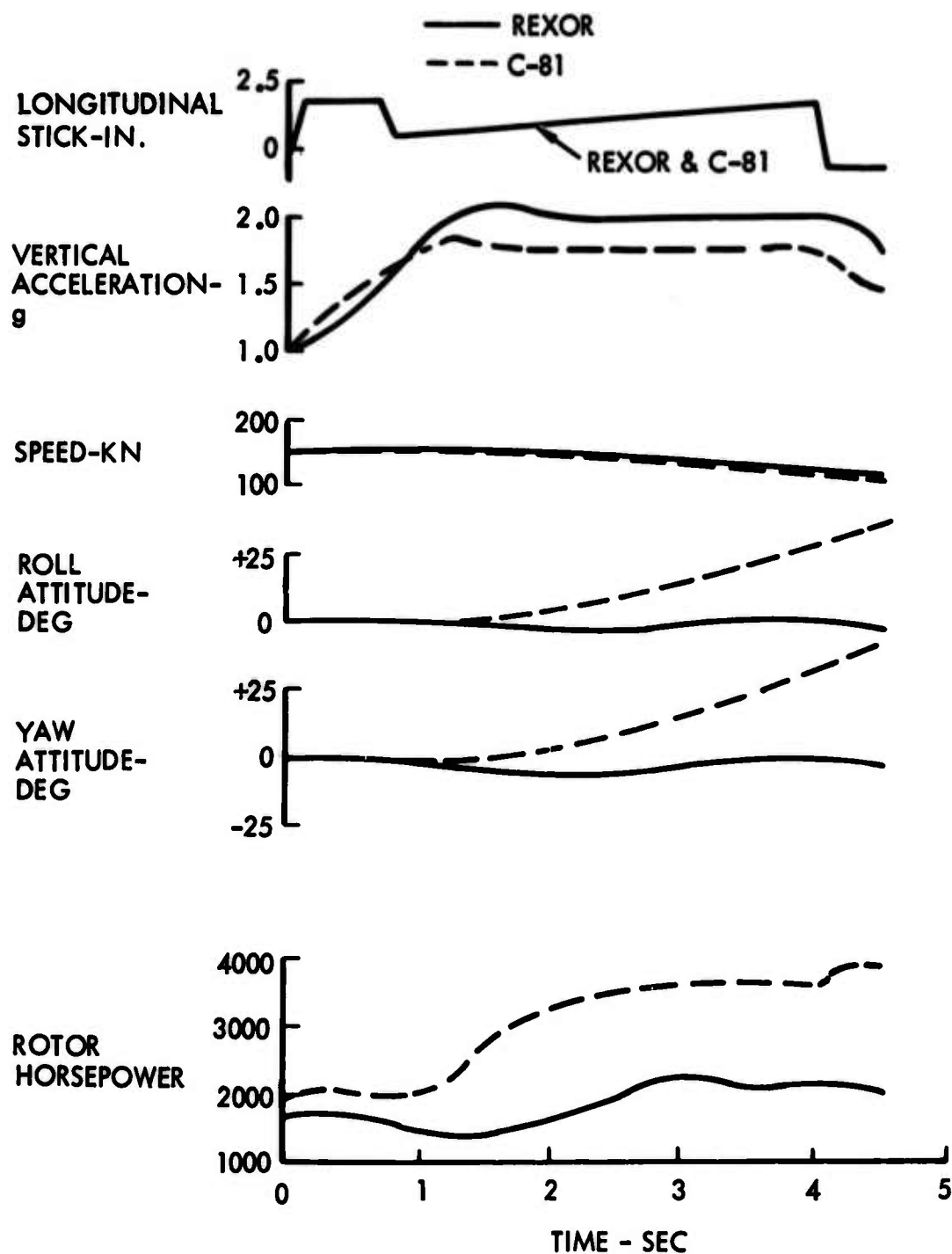


Figure 71. Pullup Maneuver to High Load Factors, 150 Knots.

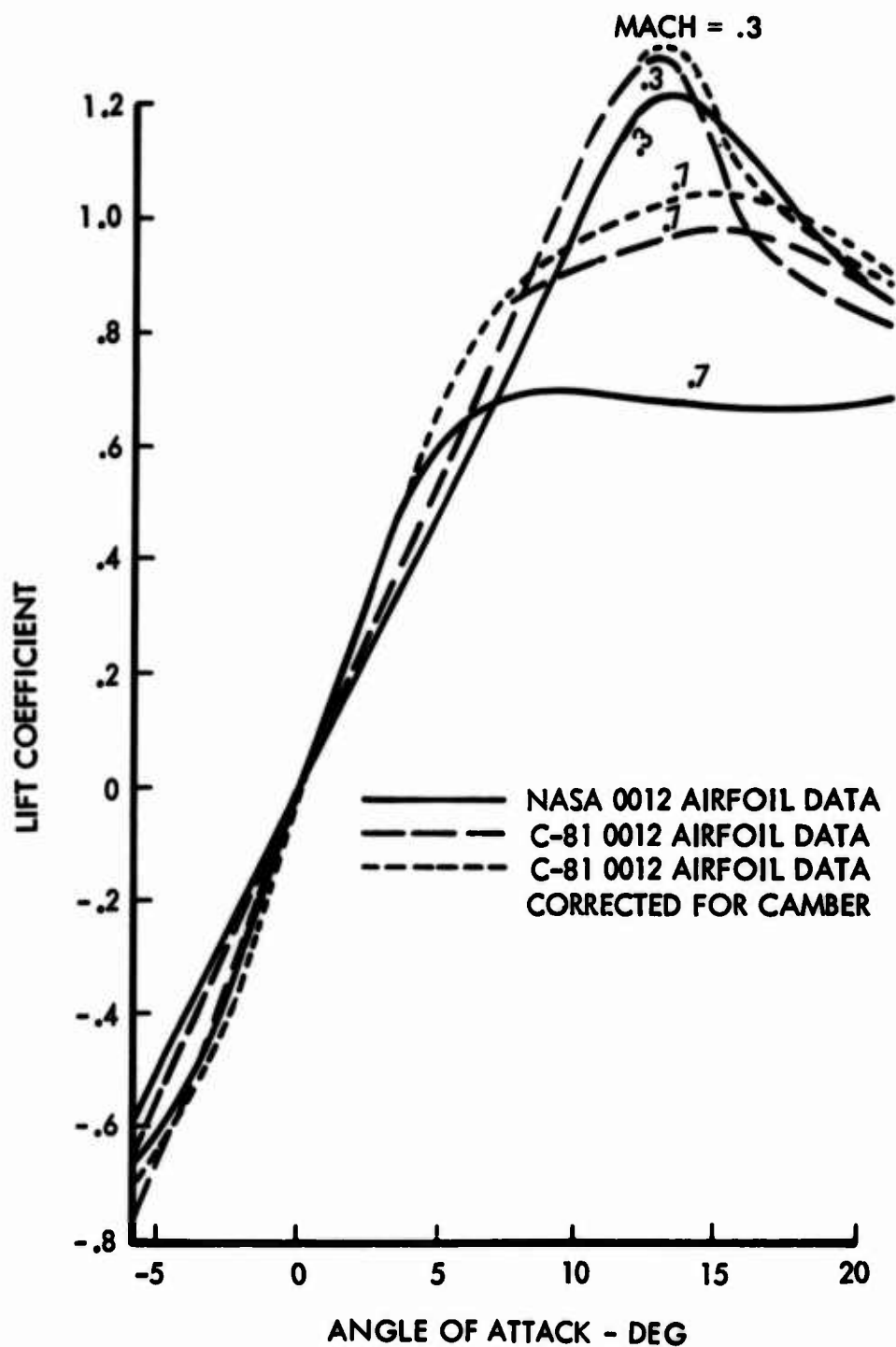


Figure 72. 0012 Airfoil Section Data, Lift Coefficient.

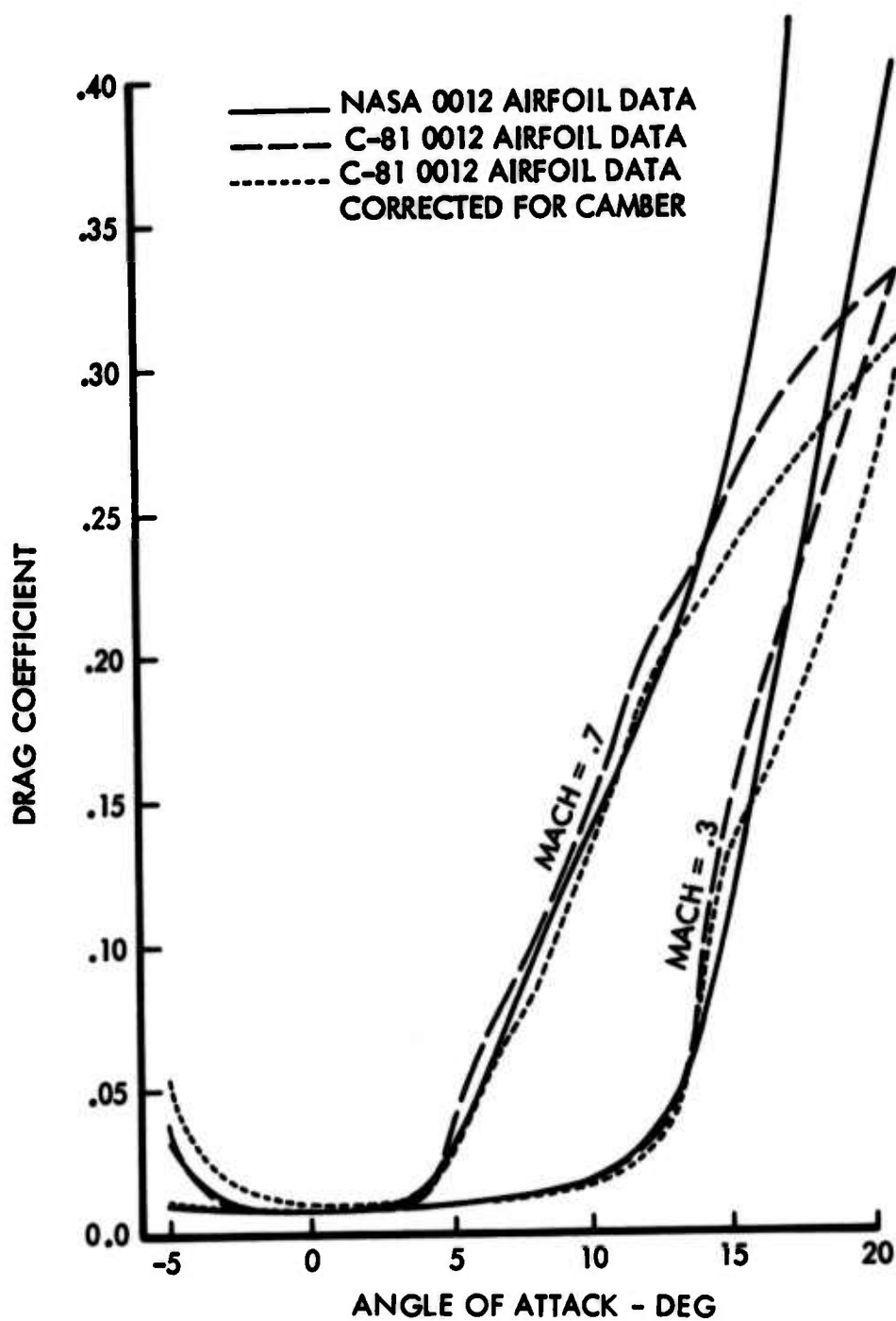


Figure 73. 0012 Airfoil Section Data, Drag Coefficient.

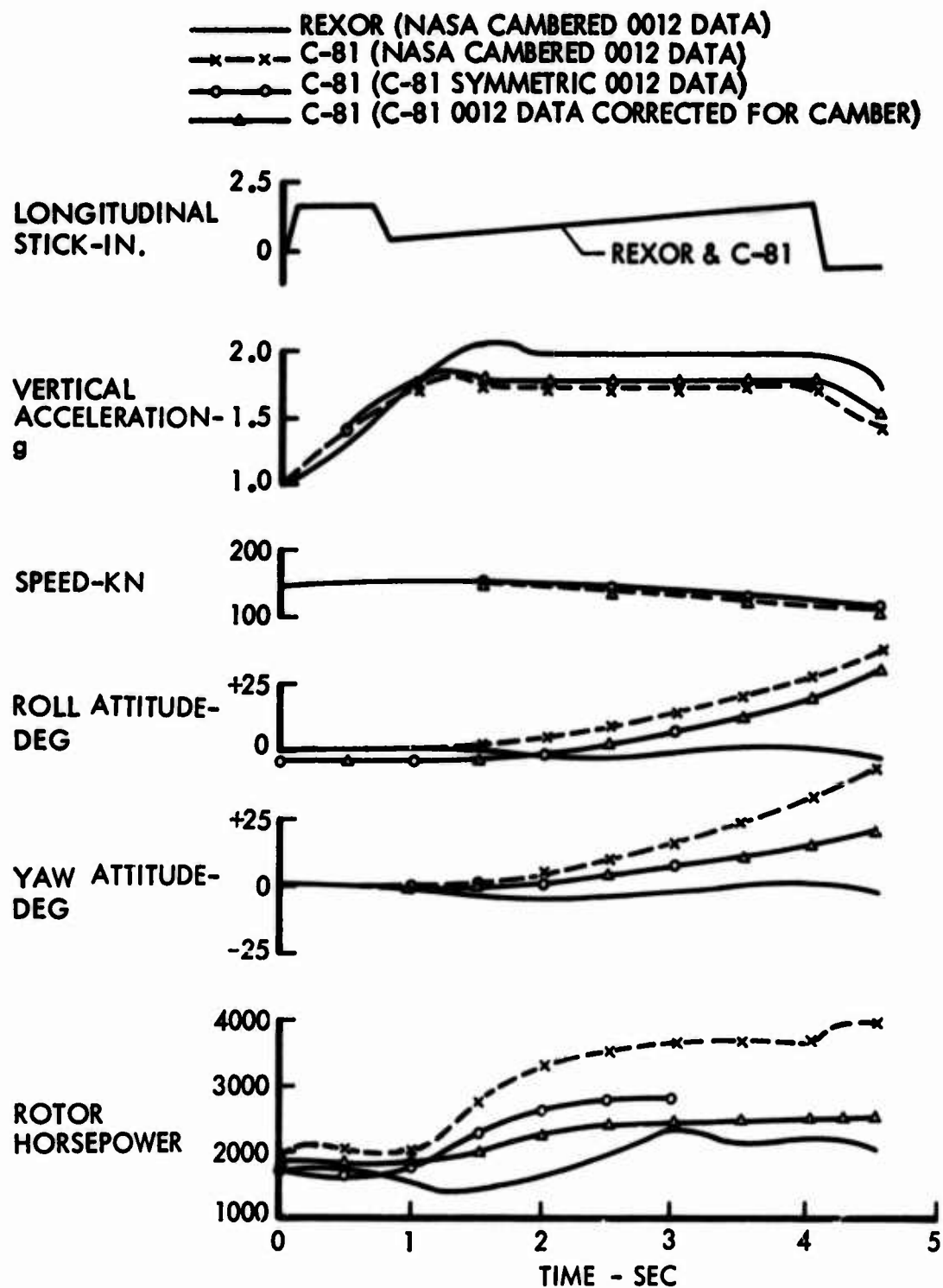


Figure 74. Pullup Maneuver to High Load Factors, Modified Airfoil Data, 150 Knots.

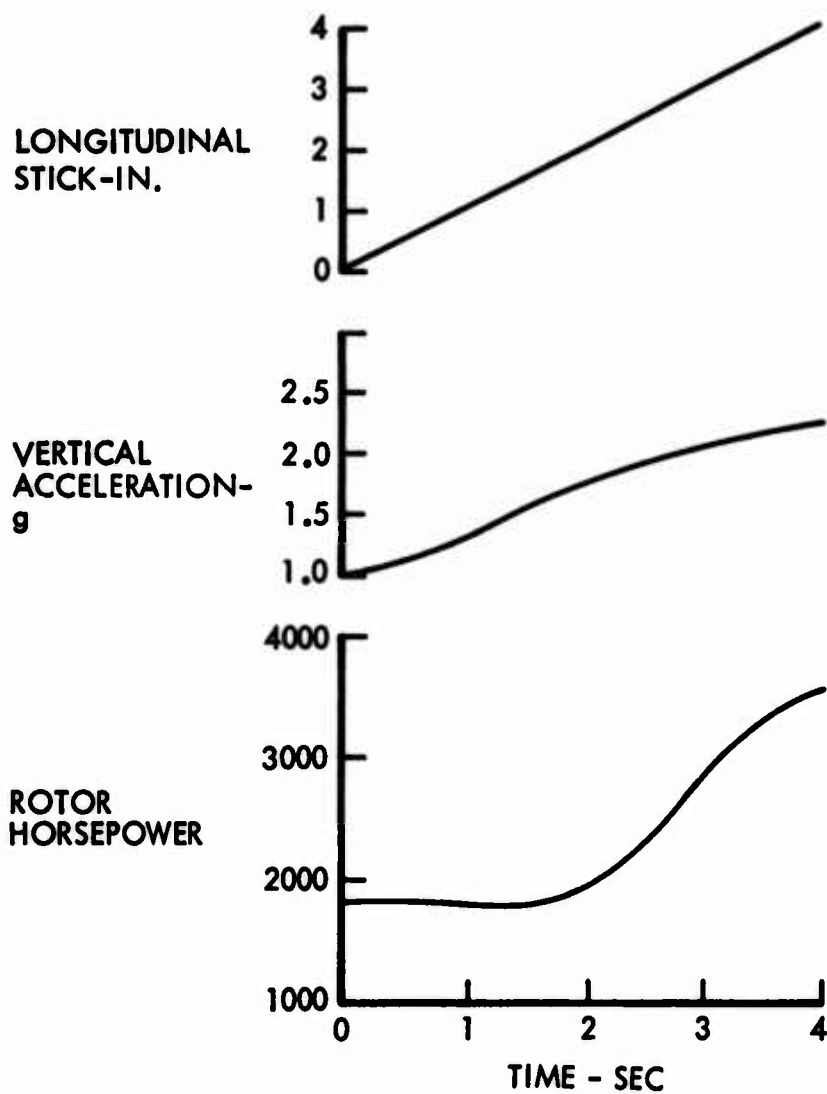


Figure 75. Gradual Pullup Manuever, 150 Knots, C-81 Program.

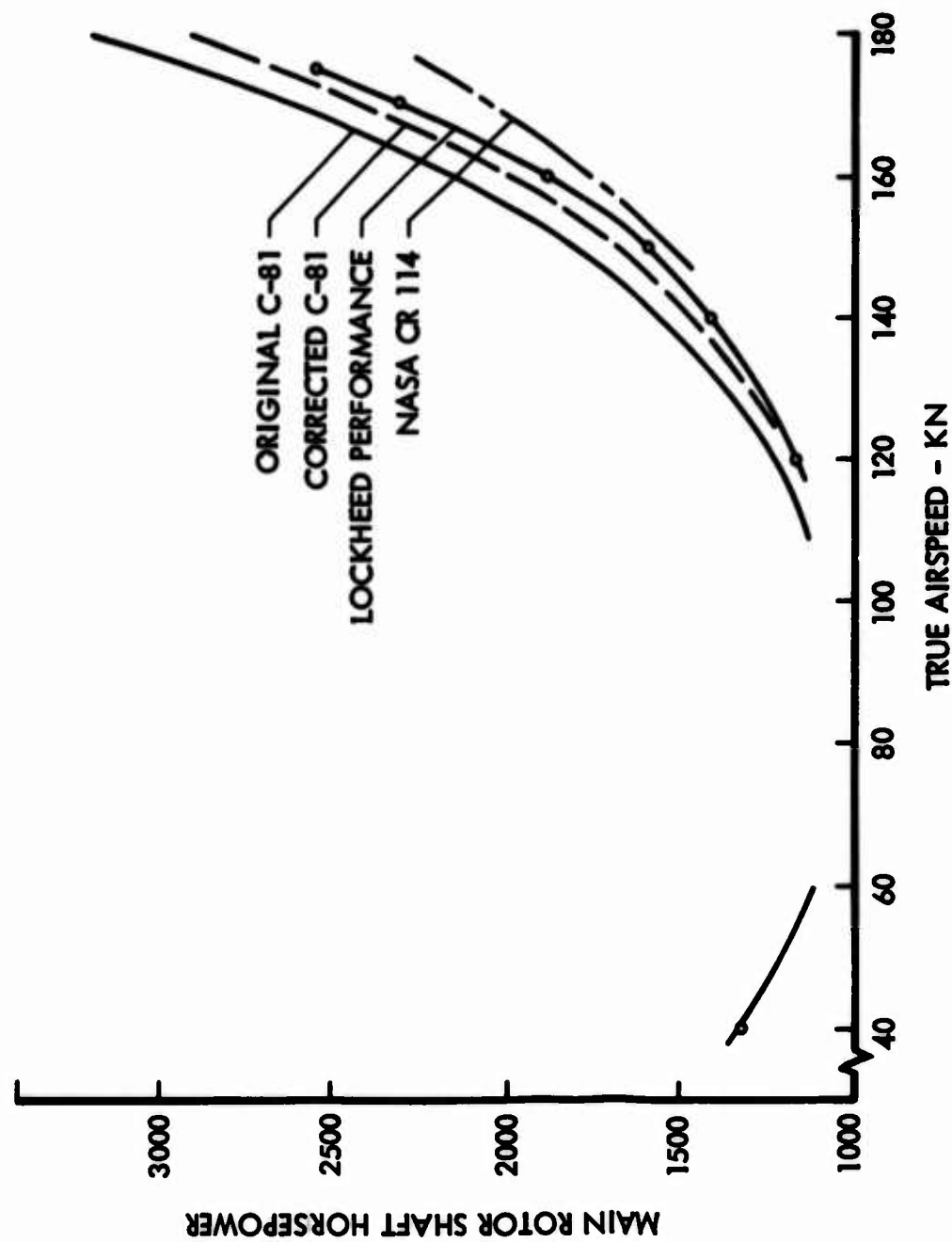


Figure 76. Forward Flight Performance.



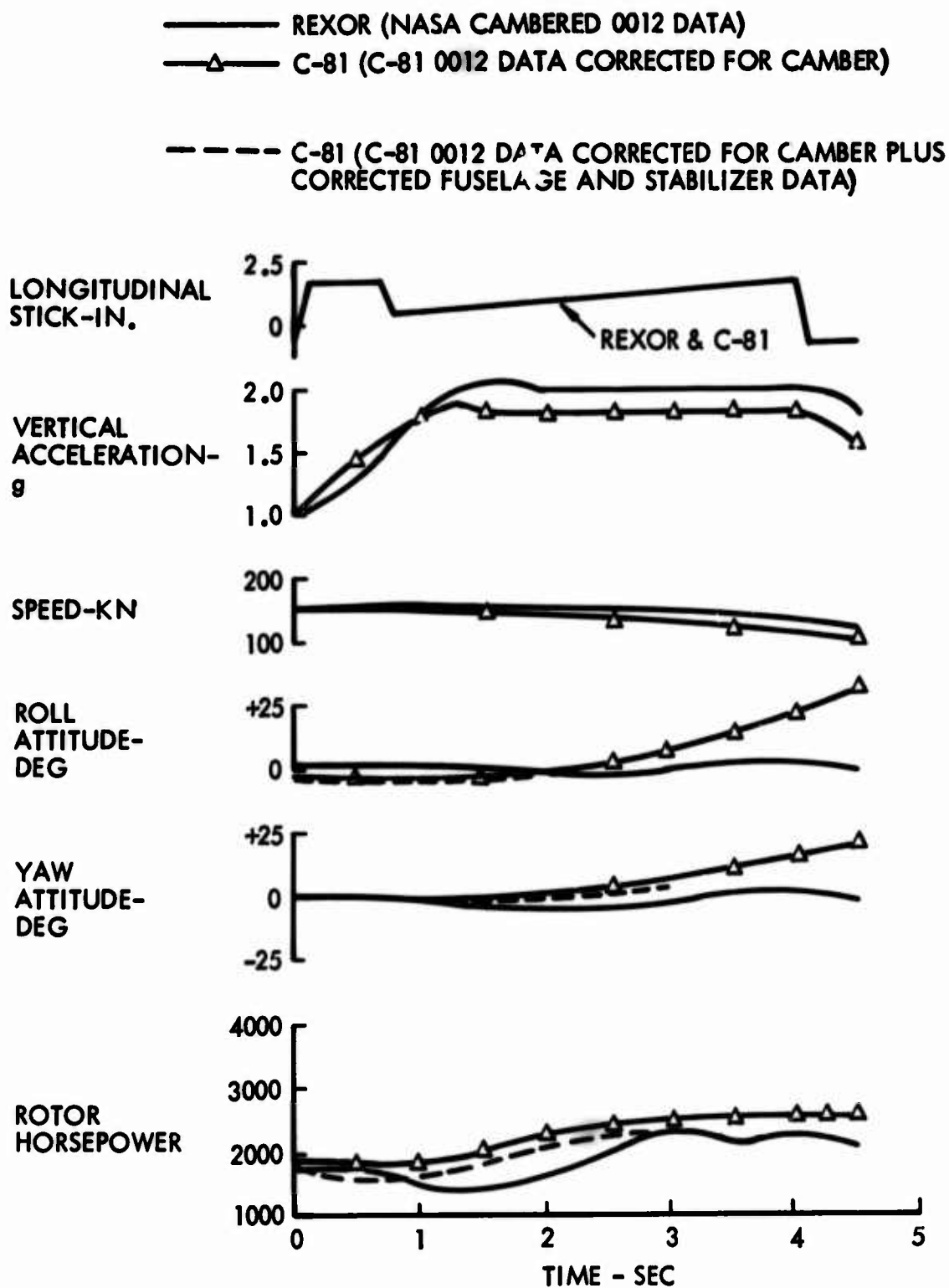


Figure 77. Pullup Maneuver To High Load Factors, Corrected Fuselage And Stabilizer Data, 150 Knots.